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BEFORE THE
SURFACE TRANSPORTATION BOARD

RAILROAD COST OF CAPITAL—2021	)	STB Docket No. EP 558 (Sub-No. 25)

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS
AND ITS MEMBER RAILROADS

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April 18, 2022

TABLE OF CONTENTS

I. Introduction 2

II. The Cost of Common Equity Capital 3

A. The CAPM Methodology 4

B. The Morningstar/Ibbotson MSDCF Methodology 6

C. Conclusion as to the Cost of Common Equity Capital 8

III. The Cost of Preferred Equity Capital 8

IV. The Cost of Debt 9

V. The 2021 Capital Structure of the Railroad Industry and the Overall Cost of Capital 10

Conclusion 10

VERIFIED STATEMENT

Witness	Subject
John T. Gray	The railroads' market value capital structure, overall cost of capital, cost of common and preferred equity, and cost of all types of debt.

*Verified statements are referenced in these comments by witness name – viz., Gray V.S. at _____.

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RAILROAD COST OF CAPITAL—2021	)	STB Docket No. EP 558 (Sub-No. 25)

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS
AND ITS MEMBER RAILROADS

By a decision served on February 11, 2022, the Surface Transportation Board ("STB" or "Board") instituted this proceeding to determine the railroad industry's cost of capital for the year 2021. The Board noted that this determination will enable it to make the required annual individual railroad revenue adequacy determination for 2021. 49 U.S.C. § 10701(d)(2), § 10704(a)(2). The Board noted further that the cost of capital determination may also be used in various other STB railroad proceedings. *See Railroad Cost of Capital—2021*, EP 558 (Sub-No. 25) (STB served Feb. 11, 2022).

The railroads, through the Association of American Railroads ("AAR"), are submitting their calculation of: (1) the railroads' 2021 cost of common equity capital; (2) the railroads' 2021 current cost of preferred equity capital; (3) the railroads' current 2021 cost of debt capital; and (4) the 2021 capital structure mix of the railroad industry on a market value basis.

The AAR's calculations are discussed in the attached verified statement of John T. Gray, Senior Vice President, Policy and Economics of the AAR. Mr. Gray's statement establishes the following:

1. The 2021 cost of common equity capital is 12.03 percent.

2. The 2021 cost of preferred equity capital is 0.00 percent.

3. The 2021 cost of debt capital is 2.63 percent.

4. The capital structure of the railroad industry is 17.71 percent debt, 0.00 percent preferred equity,[1] and 82.29 percent common equity.

From these data, Mr. Gray concludes that the overall railroad industry cost of capital for 2021 is 10.37 percent.[2]

I. Introduction

The sole purpose of this proceeding is to determine the railroad industry's cost of capital for 2021. The cost of capital will be computed using the current cost of debt and equity and market value weights. *See Standards for Railroad Revenue Adequacy*, 3 I.C.C.2d 261 (1986), *aff'd sub nom., Consolidated Rail Corporation v. United States*, 855 F.2d 78 (3rd Cir. 1988). The Board has adopted a composite railroad approach to computing an industry-wide cost of capital. This approach relies upon data from a sample of railroads meeting criteria established by the Board and its predecessor, the Interstate Commerce Commission, in Ex Parte No. 458, *Railroad Cost of Capital—1984,* 1 I.C.C.2d 989, 1003-04 (1985), and *Revisions to the Cost-of-Capital Composite Railroad Criteria*, EP 664 (Sub-No. 3) (STB served Oct. 25, 2017). Those criteria are: (1) the company is a Class I line-haul railroad; (2) if the Class I railroad is controlled by another company, the controlling company is primarily a railroad company (at least 50 percent of its total assets are devoted to railroad operations), and it is not already included in

[1] There is no preferred equity in 2021.

[2] Gray V.S. at 2, 55.

the study frame; (3) the company's bonds are rated at least BBB by Standard & Poor's and Baa by Moody's; (4) the company's stock is listed on either the New York Stock Exchange or the NASDAQ; and (5) the company has paid dividends throughout the year (2021).[3]

This year there are three railroad corporations or holding companies in the sample meeting the Board's criteria: CSX Corporation, Norfolk Southern Corporation, and Union Pacific Corporation. These are not the same four companies included in the 2020 sample, because Kansas City Southern's stock was not listed on the New York Stock Exchange or the NASDAQ for the entirety of 2021, because its stock was placed into a voting trust in December for the pendency of the control transaction.[4]

II. The Cost of Common Equity Capital

In its February 11, 2022 order instituting this proceeding, the Board directed that the cost of capital components be calculated "using the methodology followed in Railroad Cost of Capital—2020." *See Railroad Cost of Capital—2021,* EP 558 (Sub-No. 25), slip op. at 2 (STB served Feb. 11, 2022). In *Railroad Cost of Capital—2020*, the Board calculated the cost of equity component in its annual cost of capital proceeding using a simple average of the estimates produced by the Capital Asset Pricing Model (CAPM) adopted in *Methodology to be Employed in Determining the Railroad Industry's Cost of Capital,* EP 664 (STB served Jan. 17, 2008) and the Morningstar/Ibbotson Multi-Stage Discounted Cash Flow Model (MSDCF)

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[3] Effective November 24, 2017, the Board modified the fourth screening criterion to require a company's stock to be listed on either the NYSE or NASDAQ.

4 *See* Gray V.S. at 5 (citing the SEC's December 14, 2021 NOTIFICATION OF REMOVAL FROM LISTING AND/OR REGISTRATION UNDER SECTION 12(b) OF THE SECURITIES EXCHANGE ACT OF 1934 and the December 27, 2021 confirmation of the securities registration termination 15-12B (sec.gov)); *see also Canadian Pac. Ry.—Control—Kan. City S.,* FD 36500 (STB served May. 6, 2021)*; see also Canadian Pac. Ry.—Control—Kan. City S.*, FD 36500 (STB served Sept. 30, 2021) (with Vice Chairman Primus dissenting).

adopted in *Use of a Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry's Cost of Capital,* EP 664 (Sub-No. 1) (STB served Jan. 28, 2009).[5] *See Railroad Cost of Capital—2020,* EP 558 (Sub-No. 24), slip op. at 7-13 (STB served Aug. 6, 2021).[6] Mr. Gray used a simple average of the CAPM and Morningstar/Ibbotson MSDCF models adopted by the Board in his calculation of the cost of common equity in this proceeding.

A. <u>The CAPM Methodology</u>

Under the CAPM methodology as applicable to the annual cost of capital proceeding, the cost of common equity is calculated by determining the return an investor would receive on a risk-free investment and by adding to the risk-free return a premium associated with the risk of railroad stocks. The premium is calculated by multiplying the market risk premium of the stock market as a whole by a factor, known as beta, that represents the non-diversifiable risk of holding railroad stocks. In formulaic terms, the CAPM can be expressed as:

K = RF + beta (MRP)

Where K = the firm's cost of equity,
RF = the risk-free rate,
MRP = the market's risk premium, and
beta = coefficient of systematic, non-diversifiable risk of the stock.

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[5] The Morningstar/Ibbotson MSDCF model adopted by the Board is a modified version that includes only the railroads that pass the screening criteria set forth in *Railroad Cost of Capital—1984*, 1 I.C.C.2d 989 (1985), for inclusion in the sample of railroads used for the annual cost of capital determination. *See Use of a Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry's Cost of Capital,* EP 664 (Sub-No. 1), slip op. at 4 (STB served Jan. 28, 2009).

[6] The Board determined that using a simple average of CAPM and the commercially accepted Morningstar/Ibbotson multi-stage DCF model to calculate the cost of equity yields a more precise determination than relying on CAPM alone. As noted by the Board, "By using an average of the results produced by both models, we harness the strengths of both models while minimizing their respective weaknesses. The result should be a stable yet precise estimate of the cost of equity that we can use in future regulatory proceedings and to gauge the financial health of the railroad industry." *Use of a Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry's Cost of Capital*, EP 664 (Sub-No. 1), slip op. at 15 (STB served Jan. 28, 2009).

Mr. Gray's attached Verified Statement explains how the AAR calculated the cost of equity using the CAPM methodology. The risk-free rate was retrieved directly from the Federal Reserve Board website as approved by the Board in earlier proceedings, including the 2020 cost of capital proceeding. *Railroad Cost of Capital—2020,* EP 558 (Sub-No. 24), slip op. at 7. Since the 2006 cost of capital determination, the well-regarded and widely-accepted Ibbotson Equity Risk Premium has been used for the market risk premium, as found in the *Ibbotson SBBI Valuation Yearbook* published by Morningstar.[7] Though that publication was discontinued after the 2013 edition, much of the same data could be found in the *Ibbotson SBBI Classic Yearbook.* Beginning in 2016, Morningstar stopped publishing its *Ibbotson SBBI Classic Yearbook.* For the 2015 cost of capital calculation, the AAR utilized the Duff & Phelps *2016 Valuation Handbook—Guide to Cost of Capital* as a source for the Ibbotson Equity Risk Premium (a.k.a. market risk premium), because this figure is calculated using the same sources and methodology as Ibbotson.[8] Gray V.S. at 31-32. For the 2016 calculation, the same source was used: the Duff & Phelps *2017 Valuation Handbook—Guide to Cost of Capital.* Though that publication was discontinued in hardcover form, the publication is available through the Duff & Phelps online *Cost of Capital Navigator*. For the 2021 calculation, the same source was used (the Duff & Phelps *Valuation Handbook—U.S. Guide to Cost of Capital*), but it was obtained through the

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[7] Ibbotson Associates is a wholly-owned subsidiary of Morningstar, Inc. "SBBI" stands for "Stocks, Bonds, Bills, and Inflation."

[8] Duff and Phelps notes that this premium is "[c]alculated as the average annual return of the S&P 500 total return index minus the average annual return of the SBBI long-term (20-year) government bond income return series over the 1926-2016 time period. The long-horizon historical equity risk premium was previously published on the "back page" of the Morningstar/Ibbotson *SBBI Valuation Yearbook* (discontinued)."

online *Cost of Capital Navigator*. The calculation for beta was made using the S&P 500 Price Index and the same methodology approved by the Board in previous cost of capital proceedings, including the 2018, 2019, and 2020 cost of capital proceedings. Gray V.S. at 33-37.

The values determined by Mr. Gray for the elements of the CAPM methodology were 1.98 percent for the risk-free rate, 7.46 percent for the market risk premium, and 1.0704 for beta.

Based on the three-railroad composite described above and the procedures used by the STB in the last cost of capital proceeding, Mr. Gray estimates that under the CAPM methodology the cost of common equity capital for 2021 is 9.97 percent. Gray V.S. at 38.

B. <u>The Morningstar/Ibbotson MSDCF Methodology</u>

The Morningstar/Ibbotson MSDCF methodology, as adopted by the Board, calculates the cost of common equity capital as follows:

> The cost of equity in a DCF model is the discount rate that equates a firm's market value to the present value of the stream of cash flows that could affect investors. These cash flows are not presumed to be paid out to investors; instead, it is assumed investors will ultimately benefit from these cash flows through higher regular dividends, special dividends, stock buybacks, or stock price appreciation. The incorporation of these cash flows and the expected growth of earnings are the essential aspects of the multi-stage DCF we are adopting here.
>
> The Morningstar/Ibbotson model defines cash flows (CF), for the first two stages, as income before extraordinary items (IBEI) minus capital expenditures (CAPEX) plus depreciation (DEP) and deferred taxes (DT), or
>
> $$CF = IBEI – CAPEX + DEP + DT.$$
>
> An average cash flow figure is used as the starting point of the analysis under the Morningstar/Ibbotson model. To find the average cash flow, the model uses the 5-year period leading up to the year being analyzed, and the total cash flows for that time period are divided by total sales, which determine the 5-year cash-flow-to-sales ratio. The ratio is then multiplied by the total sales for the year

> being analyzed to obtain the average cash flow estimate for that year. For the third (and final) stage of the Morningstar/Ibbotson multistage DCF model stage, Morningstar/Ibbotson uses two additional assumptions: that there is no depreciation or deferred taxes. Therefore, in the third stage, cash flows are based solely on income before extraordinary items.
>
> Growth of earnings is also calculated in three stages. In the first stage (years 1-5), the firm's annual earnings growth rate is assumed to be the median value of the qualifying railroad's 3- to 5-year growth estimates as determined by railroad industry analysts and published by Institutional Brokers Estimate System (IBES). In the second stage (years 6-10), the growth rate is the simple average of all growth rates in stage 1. In stage three (years 11 and onwards), the growth rate is the average long-run nominal growth rate of the U.S. economy. This long-run nominal growth rate is estimated by using the historical growth in real GDP and the long-run expected inflation rate.

Use of a Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry's Cost of Capital, EP 664 (Sub-No. 1), slip. op. at 5-6 (STB served Jan. 28, 2009).

The cost of common equity capital using the Morningstar/Ibbotson MSDCF model adopted by the Board is also calculated and explained in the attached Verified Statement of Mr. Gray. Consistent with the methodology approved by the Board in *Railroad Cost of Capital—2008*, EP 558 (Sub-No. 12), slip op. at 9-10 (STB served Sept. 25, 2009), Mr. Gray's calculations used only IBES growth estimates (distributed by Refinitiv) available as of December 31, 2021, and stock market values were based on shares outstanding and stock prices as of the last trading day of the last full week for 2021—December 31, 2021 (Friday). Gray V.S. at 43-48.[9]

Mr. Gray calculates the cost of common equity capital for 2021, using the STB's version of the Morningstar/Ibbotson MSDCF model, as 14.09 percent. Gray V.S. at 51.

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[9] Consistent with the methodology approved by the Board in *Railroad Cost of Capital—2017,* EP 558 (Sub-No. 21), slip op. at 11-12, Mr. Gray's calculations used data inputs in the cash flow formula as retrieved from the railroads' 2017-2021 10-K filings with the SEC (and used restated data where set forth in any subsequently filed 10-K filings with the SEC). *See* Gray V.S. at 40-42.

C. Conclusion as to the Cost of Common Equity Capital

Under the Board's methodology, the cost of common equity capital is the simple average of the results using the CAPM and Morningstar/Ibbotson MSDCF models. The simple average produces a cost of common equity capital of 12.03 percent for 2021. Gray V.S. at 51-52.

III. The Cost of Preferred Equity Capital

Preferred stock is a hybrid security which has some characteristics of debt and some characteristics of equity. Its cost depends on its specific features. The methodology used by the Board applies the following criteria:

(a) Where the preferred is not convertible into common stock, and where the corporation is not required to redeem the preferred at specific times, the cost of preferred equity is equal to its current dividend yield.

(b) Where the preferred is not convertible but is subject to mandatory redemption providing holders of the instrument with a premium, the cost is equal to the current dividend yield, plus the present value of the premium.

(c) Where the preferred is convertible at the option of the holder, and the market values of the preferred and common indicate that conversion is likely to occur or that the conversion right controls the price of the preferred, the preferred has the same cost as common equity.

From 2003 until 2012, no railroads in the composite had preferred stock outstanding. Beginning in 2013, one of the railroad companies comprising the railroad sample had preferred stock outstanding, and this continued through 2020. However, that one railroad company,

Kansas City Southern, no longer meets the criteria for inclusion in the sample, so there is no preferred stock in this year's calculation. The estimated cost of preferred equity is 0.00 percent for 2021. Gray V.S. at 56.

IV. The Cost of Debt

According to the Board's well-established methodology, the cost of debt includes costs for three categories (bonds, equipment trust certificates, conditional sales agreements) of debt instruments, plus flotation costs. *See, e.g., Railroad Cost of Capital—1997,* EP 558 (Sub-No. 1), slip op. at 2-3 (STB served July 16, 1998); *Railroad Cost of Capital—2020*, EP 558 (Sub-No. 24), slip op. at 3. To determine the cost of debt for bonds,[10] Mr. Gray has computed the average current bond yield for 126 bonds from the sample railroads for which data were available during 2021 according to the Board's well-established methodology. Under this approach, the bond yield is based on a sample representing 99.2 percent of the book value of the bonds issued by the railroads in the sample.[11] As the Board has recognized, equipment trust certificates (ETCs) and conditional sales agreements (CSAs) are not actively traded in secondary markets. Their costs were therefore estimated by comparing them to the yields on Treasury securities that are actively traded.[12] The composite current cost of debt is the market-weighted average cost of bonds, ETCs, and CSAs (if there were any), plus a small flotation cost.[13] Using

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[10] The term "bonds" is used to describe bonds, notes, debentures, and other similar types of debt.

[11] Bond data were retrieved from a Bloomberg database. Gray V.S. at 9-11.

[12] Gray V.S. at 11, 15-16. No CSAs were modeled because none are outstanding.

[13] In this proceeding, the AAR calculated bond flotation costs by using data reported by the sample railroads to the Securities and Exchange Commission (SEC) regarding new debt offerings in 2021. This is the same methodology approved by the Board in *Railroad Cost of Capital –2020,* EP 558 (Sub-No. 24), slip op. at 6. Gray V.S. at 20-24.

the Board's established methodology, the railroads' 2021 cost of new debt is 2.63 percent. Gray V.S. at 25.

V. The 2021 Capital Structure of the Railroad Industry and the Overall Cost of Capital

Pursuant to the Board's February 11, 2022 decision, the market values of debt, preferred equity, and common equity were compiled to compute the 2021 capital structure of the railroad industry. The railroads' market value capital structure on a market value basis is 17.71 percent debt, 82.29 percent common equity capital, and 0.00 percent preferred equity capital. Gray V.S. at 57. Based upon this capital structure, the overall 2021 cost of capital is 10.37 percent. Gray V.S. at 57-58.

Conclusion

The Board should determine that the railroads' cost of capital for 2021 is 10.37 percent.

Respectfully submitted,

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April 18, 2022

CERTIFICATE OF SERVICE

I hereby certify that on this 18th day of April, 2022, I caused to be served by electronic mail a copy of the foregoing on the following:

Robert D. Rosenberg
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1224 Seventeenth St., NW
Washington, DC 20036-3003

/s/ Kathleen Birch
Kathleen Birch

BEFORE THE

SURFACE TRANSPORTATION BOARD

EX PARTE NO. 558 (Sub-No. 25)

RAILROAD COST OF CAPITAL — 2021

VERIFIED STATEMENT

OF

JOHN T. GRAY

SENIOR VICE PRESIDENT — POLICY AND ECONOMICS

ASSOCIATION OF AMERICAN RAILROADS

April 18, 2022

Table of Contents

Page

I. Introduction 1

II. Determining the Cost of Capital 3

A. Defining the Cost of Capital 3
B. The Composite Railroad Approach 3
C. Selection of Railroads for Analysis 4
D. Types of Railroad Capital 6

III. Debt Capital in 2021 7

A. Bonds, Notes and Debentures 8
1. Market Value of Bonds, Notes and Debentures 9
2. Current Cost of Bonds, Notes and Debentures 11
B. Equipment Trust Certificates 12
C. Conditional Sales Agreements 16
D. All Other Debt 17
E. Market Value of Debt 18
F. Flotation Costs for Debt Capital 19
G. Conclusion as to the Cost of Debt Capital 24

IV. Common Equity Capital in 2021 25

A. The Market Value of Common Equity Capital 25
B. The Capital Asset Pricing Model (CAPM) 27
1. Risk Free Rate (RF) 29
2. Market Risk Premium (MRP) 30
3. Beta 32
4. Cost of Common Equity Using the CAPM 37
C. The Multi-Stage Discounted Cash Flow Model 38
1. Cash Flows 40
2. Growth Rates 42
3. Market Values 48
4. Cost of Common Equity Using the MSDCF Model 49
D. Conclusion as to Cost of Common Equity Capital 51

V. Preferred Equity Capital in 2021 52

A. Overview of Preferred Stock 53

B. The Market Value of Preferred Equity Capital 54

C. The Cost of Preferred Equity Capital 55

VI. The Overall Cost of Capital in 2021 56

A. Determination of Market Value Weights 56

B. The Overall Cost of Capital 58

VII. Qualifications of John T. Gray 58

List of Tables

Page

1. Evaluation of Class I Railroads 5
2. Bonds, Notes and Debentures - Average Market Value 10
3. Bonds, Notes and Debentures - Weighted Current Cost 11
4. History of Premiums for Equipment Trust Certificates (ETC) 14
5. Summary of Equipment Trust Certificates Modeled for 2021 15
6. Market Value of Debt 19
7. Flotation Costs for Equipment Trust Certificates 23
8. Flotation Costs for Debt 24
9. Composite Current Cost of Debt 25
10. Average Market Value for Common Equity in 2021 26
11. 20-Year U.S. Treasury Bonds 2012 - 2021 30
12. Cost of Common Equity Using STB's Capital Asset Pricing Model 38
13. Example Cash Flow Calculations for CSX in 2021 41
14. 2021 Thomson Median Growth Rate Estimates 44
15. Equity Market Value on Year-End, 2021 49
16. Cost of Equity Using STB's Ibbotson MSDCF 51
17. Cost of Common Equity Capital 52
18. Average Market Value for Preferred Equity in 2021 55
19. Cost of Preferred Equity Capital 56
20. Capital Structure and Weights 57
21. Weighted Current Cost of Capital 58

List of Charts

Page

1. S&P 500 (2021 vs. 2020) 27

List of Appendices

Appendix A — Bonds, Notes and Debentures

Appendix B — Interest Rates on Selected Government Instruments (Yield Curve)

Appendix C — Equipment Trust Certificates

Appendix D — 2021 Market Value of Debt

Appendix E — 2021 Flotation Costs for Bonds

Appendix F — 2021 Current Cost of Debt

Appendix G — Market Value for Common Equity (2021)

Appendix H — Historical Risk Free Rates and Market Risk Premiums

Appendix I — AAR Regression for 2021 Beta

Appendix J — Cost of Common Equity Using the Multi-Stage DCF model (formula)

Appendix K — Cash Flow Calculation

Appendix L — 2021 Median Growth Rates for MSDCF

Appendix M — Stage 3 Growth Rate for MSDCF

Appendix N — Market Value Data for MSDCF

Appendix O — 2021 Cost of Equity Using STB's MSDCF

Appendix P — 2021 Preferred Equity

Verified Statement

of

John T. Gray

I. Introduction

My name is John T. Gray. I am Senior Vice President – Policy and Economics of the Association of American Railroads (AAR), with offices at 425 Third Street, SW, Suite 1000, Washington, DC 20024. The AAR is the trade association of the Nation's major railroads, as well as the railroads of Canada and Mexico. The AAR's United States railroad members, which include all Class I railroads plus about 150 additional Class II and III freight railroads, account for approximately 97 percent of our Nation's total railroad freight operating revenue.

When appropriate, the AAR represents the railroad industry before government bodies, including economic regulatory proceedings before the Surface Transportation Board ("STB" or "Board"). In particular, the AAR has participated in all of the STB proceedings addressing revenue adequacy standards and the annual cost of capital determinations.

Aside from other responsibilities, I have conducted or directed a wide range of analyses and projects addressing regulatory, legislative and internal issues relevant to railroads. Furthermore, I have testified before federal regulatory agencies, and have been an expert witness for a railroad. A summary of my qualifications and experience appears at the end of this statement.

In this submission, I am responding to the Board's decision of February 10, 2022 (served February 11), instituting a proceeding to determine the railroad industry's 2021 cost of capital — Ex Parte No. 558 (Sub-No. 25), *Railroad Cost of Capital — 2021* ("Ex Parte 558

Decision"). In my statement, I calculate the cost of debt for the railroad industry using the procedures accepted in previous STB proceedings. I also calculate the cost of common equity using a simple average of the estimates produced using the following methods: (1) the Capital Asset Pricing Model used by the Board in Ex Parte No. 558 (Sub-No. 24); and (2) the STB's version of the Morningstar/Ibbotson Multi-Stage Discounted Cash Flow Model as used by the Board in Ex Parte No. 558 (Sub-No. 24) – including the Board's deferred tax adjustment to 2017 data. In addition, I calculate a cost of preferred equity using the dividend yield method, as used in Ex Parte No. 558 (Sub-No. 24). Finally, I calculate the market value capital structure and the overall cost of capital using the procedures accepted in previous Cost of Capital proceedings. This statement presents the details for calculating the necessary components for the overall cost of capital: the market value capital structure, the cost of debt, the cost of common equity capital using the Capital Asset Pricing Model and the Multi-Stage Discounted Cash Flow Model, and, as applicable, the cost of preferred equity capital.

I conclude that the 2021 cost of capital for the railroad industry is 10.37 percent. This estimate is based on a current cost of debt of 2.63 percent, a cost of common equity capital of 12.03 percent; a cost of preferred equity of 0.00 percent; and market value weights for debt, common equity, and preferred equity of 17.71 percent, 82.29 percent, and 0.00 percent, respectively.

II. Determining the Cost of Capital

A. Defining the Cost of Capital

The cost of capital for a firm is the minimum rate of return on investment that the providers of capital require as a condition for making an investment in the firm. In essence, it is the threshold rate of return that makes investment in the firm attractive. The cost of capital necessarily incorporates long-term investor expectations for a company's performance. Investment funds flow to companies where the expected returns, over the investors' investment horizons, are thought to at least equal the expected returns available from other investment opportunities, giving consideration to the relative (or commensurate) risk of investment. Similarly within a company, limited capital resources flow to projects where the expected returns are anticipated to be highest, giving consideration to the relative (or commensurate) risk, uncertainty and timing of investment. Methods used to estimate the cost of capital therefore attempt to measure investor expectations. Such models of future behavior are inherently uncertain, and cost of capital computations provide only an estimate of an expected value of the cost of invested capital at a particular point in time. For some types of capital, such as traded bonds, investor expectations can be readily observed. For other types of capital, such as common equity, modeling is necessary.

B. The Composite Railroad Approach

The STB has adopted a composite railroad approach to computing an industry-wide cost of capital. This approach relies upon data from a sample of railroads meeting criteria established by the Board's predecessor, the Interstate Commerce Commission, in Ex Parte No.

458, *Railroad Cost of Capital — 1984,* 1 I.C.C. 2d 989, 1003–1004 (1985), and modified by the STB in Ex Parte No. 664 (Sub-No. 3) served October 25, 2017.

C. Selection of Railroads for Analysis

Under the criteria established by the Board for individual firm inclusion in the composite railroad sample, a company must meet certain criteria. (Ex Parte 558 Sub-No. 25 Decision) Those criteria are:

- The company is a Class I line-haul railroad.
- If the Class I railroad is controlled by another company, the controlling company is primarily a railroad company (at least 50 percent of its total assets are devoted to railroad operations), and it is not already included in the study frame.
- The company's bonds are rated at least BBB by Standard & Poor's and Baa by Moody's.
- The company's stock is listed on either the NYSE or the NASDAQ.
- The company has paid dividends throughout the year (2021).

Table 1 lists the AAR's evaluation of railroad companies that may meet the STB's criteria.

Table No. 1
Evaluation of Class I Railroads
Under Surface Transportation Board Selection Criteria
2021

Class I Railroad	Parent	Stock Symbol	Dividends Throughout 2021	Rail Assets Account For At Least 50% of Parent	Adequate Debt Rating	NYSE or NASDAQ
BNSF	Berkshire Hathaway	BRK-A	No	No	Yes	Yes
CSX	CSX Corporation	CSX	Yes	Yes	Yes	Yes
CNGT*	Canadian National Railway Co.	CNI	---	Non-U.S. company	---	
KCS	Canadian Pacific Railway Ltd.	KSU	Yes	Yes	Yes	No
NS	Norfolk Southern Corporation	NSC	Yes	Yes	Yes	Yes
CPSL*	Canadian Pacific Railway Ltd.	CP	---	Non-U.S. company	---	
UP	Union Pacific Corporation	UNP	Yes	Yes	Yes	Yes

* CNGT is Grand Trunk Corporation, and consists of almost all of the U.S. railroad operations of Canadian National Railway (a.k.a. CN). CPSL is Soo Line Corporation, and consists of the U.S. operations of Canadian Pacific (CP). Following STB precedent, CN and Canadian Pacific were not included in the sample because both CN and Canadian Pacific are Canadian corporations – and the cost of capital proceeding is concerned with determining costs for U.S. railroads under STB jurisdiction.

This year there are three railroad corporations or holding companies in the sample meeting the Board's criteria: CSX Corporation, Norfolk Southern Corporation, and Union Pacific Corporation. Kansas City Southern no longer meets the Board's criteria, since it's stock is no longer listed on the NYSE or NASDAQ.[1] Consistent with past proceedings, the two Canadian-owned railroads have been excluded from the sample.[2] Berkshire Hathaway, owner of BNSF Railway Company, did not pay dividends throughout 2021, and the railroad is less than 50% of

[1] *See* the SEC's December 14, 2021 NOTIFICATION OF REMOVAL FROM LISTING AND/OR REGISTRATION UNDER SECTION 12(b) OF THE SECURITIES EXCHANGE ACT OF 1934 and the December 27, 2021 confirmation of the securities registration termination 15-12B (sec.gov) .

[2] *See* STB Ex Parte No. 558, decided July 2, 1997, page 2, and verified statement of Craig F. Rockey on behalf of the Association of American Railroads in Ex Parte No. 558, submitted March 19, 1997, Table 1 on page 6. Accounting methods, differences in the treatment of taxes, and currency conversion could also be issues if foreign companies were added to the composite railroad. The railroad parents (CN and Canadian Pacific) are still more Canadian than USA. Comparing operating revenues for 2020 as reported in the AAR's *Railroad Facts* book, 2021 edition: CNGT was 30 percent of CN, and SOO was 24 percent of Canadian Pacific.

the company's assets.[3] Based on data from Annual Report Form R-1 for 2021, the three-firm composite accounts for 60 percent of the operating revenues and 59 percent of the assets of all Class I railroads.

D. Types of Railroad Capital

The total capital of a firm may include various forms of debt and two types of equity; common stock and preferred stock. Each of these three sources of capital has different expected rates of return (reflecting different levels of perceived risk of the particular debt or equity instrument), and the overall cost of capital is calculated as the market value weighted average of the costs of common equity, preferred equity, and debt. Different approaches are used to estimate the costs of each of the types of capital. In this statement, 99 percent of the cost of debt is calculated using bonds and similar instruments (including notes and debentures). The remaining 1 percent – in the form of Equipment Trust Certificates – is calculated with a long-used model that permits comparison of market-determined yields for government debt, and the historical relationship between government debt and the type of railroad debt modeled.[4] No Conditional Sales Agreements were used to calculate the 2021 cost of debt because they have all been retired. The estimate of the cost of common equity is a simple average of the results from two estimation methods. One method is calculated using the

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[3] The rail operations of BNSF Railway Company are the principal operating subsidiary of Burlington Northern Santa Fe, LLC – which is a subsidiary of Berkshire Hathaway, Inc. For 2021, BNSF accounted for 9.5 percent of Berkshire Hathaway assets. Among the many other diverse subsidiaries of Berkshire Hathaway are GEICO, Fruit of the Loom, Helzberg Diamonds and Dairy Queen. The company also owns pipelines, manufacturers, numerous automobile dealerships, real estate companies, and newspapers.

[4] There are currently four Equipment Trust Certificates modeled.

backward-looking Capital Asset Pricing Model (CAPM) following the methodology prescribed by the Board in the 2020 Cost of Capital decision. The other method is calculated using the somewhat more forward looking Multi-Stage Discounted Cash Flow model (MSDCF) methodology prescribed by the Board in the 2020 Cost of Capital Decision. The cost of preferred equity capital has been calculated using a simple dividend yield method, as used in the 2020 Cost of Capital Decision; however, none of the participating railroads have any preferred equity this year. Calculations for all three types of capital are based on data through 2021. The industry's overall cost of capital is computed as a weighted average of the three costs — debt, common equity, and preferred equity — based upon the market value for each type of capital.

III. Debt Capital in 2021

The current cost of debt is determined from the current market-determined yields on all debt outstanding. This approach is necessary, and in past Board Cost of Capital decisions has been accepted as appropriate, because of the reasons listed below.[5]

(1) There is a lack of sufficient new issues from which to develop a representative, and statistically reliable, current cost.

(2) The stated rate of interest/dividend payment to the investor is not always the same as the cost to the railroad. For example, when securities are issued, the total amount paid by investors is seldom received by the railroad.

[5] *See* Ex Parte Nos. 415, 436, 452, 458, 464, 466, 473, 478, 486, 491, 506, 513, 518, 523, 523 (Sub-No. 1), 558, and 558 (Sub-No. 1) through (Sub-No. 24).

Administrative fees, such as compensation paid to investment bankers, reduce the proceeds to the railroad. The effect of this is to increase the cost of the securities to the railroad.

(3) The maturity mix and the type of instrument (equipment trust certificates, conditional sales agreements, long-term debt) of new security issues may be different from the average of existing securities. Because of the effect that length of maturity and type of security has on its current cost, the use of only new issues would not accurately measure the current cost.

(4) The quantity and quality of existing debt has an impact on the yield of new issues.

A. Bonds, Notes and Debentures

As in previous Cost of Capital determinations, calculations relating to the bond market value use market data for the composite railroad whenever possible, and calculations for the cost of bond debt rely entirely on market data.[6] Multiple sources for market data are available, and each source has its own criteria for including a financial instrument in its database. However, no market data will be available in any database for bonds that do not trade.[7] For 2021, yields and prices of the sample railroads' bonds, notes and debentures were obtained

[6] The terms "bonds" and "bonds, notes, and debentures" are used interchangeably herein.

[7] In some cases, a comparable bond method could be used, where yields for traded bonds could be used for non-traded bonds with similar qualities (maturity date and type of instrument), enabling the calculation of a probable market price. Another approach would be to construct a yield curve for a railroad. We have not recommended these approaches because the supply of bonds with market data is adequate.

from Bloomberg.[8] This source is the same data source used since the 2011 cost of capital determination. We were able to find data for 125 unique CUSIPs (bond identifiers).[9] Appendix A lists market value data for 126 bonds because one set of notes was issued twice during 2021, and the portions needed to be split for prorating purposes.[10] The 126 bonds represent 99.2 percent of the book value of all railroad bonds belonging to the composite railroad.[11] The bonds not included in the market value calculation are those that are either not in Bloomberg's database, or were in the database but did not trade.

1. Market Value of Bonds, Notes, and Debentures

The average market value for traded bonds, notes, and debentures is calculated using the methodology employed in previous Cost of Capital proceedings. For each of the 126 bonds with market data in 2021, an average price is calculated based on the simple average of monthly prices. The prices represent what the investor is willing to pay for the bond given its coupon rate and maturity date. The market value is the average market price (stated as a price per hundred dollars of principal) times the amount of debt outstanding as of December 31,

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[8] Bloomberg's product is called Bloomberg Professional, and it is available as a subscription service. https://www.bloomberg.com/professional/

[9] A CUSIP number is a 9-character identification code used to identify a security. CUSIP is an abbreviation for Committee on Uniform Securities Identification Procedures.

[10] In one case, a portion of a series of notes was issued twice in 2021. In each case, the two portions were kept separate to enable both portions to be correctly prorated for the year and therefore follow STB procedure. Thus, Appendix A has 126 "bonds" and 125 unique CUSIPs. See bonds 72 and 73 in Appendix A, and pages 1 and 2 of Appendix E.

[11] In some cases, similar series of bonds have been assigned two CUSIPs because a privately-placed portion trades *among* qualified institutional buyers instead of *through an exchange*. This can also happen in a bond exchange offer where not all of the "old" bonds have been redeemed for the new version.

2021.[12] Where market prices are not available (i.e., for instruments that did not trade or were not found in the Bloomberg database), the "face value" of the bond is assumed to be the price investors would pay. This assumption may slightly overstate the market value of some issues and understate the value of others, depending upon the relationship of the instruments' coupon rate and the current market rate. However, this possible variation is not likely to significantly affect the overall estimate of the cost of debt capital, since the differences are likely to be both small and offsetting – and, most importantly, since 99.2 percent of the book value of bonds is priced at market. Table 2 summarizes the results of the market value calculations for 2021. The market value for bonds, notes, and debentures that traded is $60.9 billion, which is 99.3 percent of the total market value of $61.34 billion.

Table No. 2
Bonds, Notes and Debentures
Average Market Value

Railroad Co.	Traded Value ($000)	Non-Traded Value ($000)	Total Value ($000)	Weight Based on Traded
CSX	$18,978,132	$441,679	$19,419,812	31.16 %
NSC	$15,633,898	$0	15,633,898	25.67
UNP	$26,287,202	$0	26,287,202	43.17
Total	$60,899,233	$441,679	$61,340,912	100.00 %
Prior Year	$65,005,154	$507,849	$65,513,003	
Change	-6.3%	-13.0%	-6.4%	

[12] Securities that were newly issued during the year were prorated by the ratio of the number of months outstanding (rounded to the nearest half month) to the twelve-month year, as done in past proceedings.

Total market value for bonds is down 6.4 percent from the previous year. Among the causes of this decrease are fewer new debt offerings, and fewer total bonds given the smaller sample size for the composite railroad.

Appendix A lists details for each of the 126 bonds, notes, and debentures belonging to the composite railroad that have trading data available for 2021 in the Bloomberg database. As footnoted earlier, there are a few cases where a similar series of bonds has been assigned two CUSIPs because a privately-placed portion trades among qualified institutional buyers instead of through an exchange, as allowed under the Securities and Exchange Commission's Rule 144A. There is also one case where a series was split for prorating purposes. All instruments are summarized for each sample railroad in the front of the Appendix. Book values for non-traded debt are also listed.

2. Current Cost of Bonds, Notes, and Debentures

Table 3 summarizes the yield or cost of each railroad's debt (bonds, notes, and debentures), which, when weighted by the market value of the traded debt (as shown in Table 3), determines the sample composite cost of bonds, notes and debentures. The weighted average is 2.585 percent, which is 0.087 percentage points higher than 2020's figure of 2.498 percent.

Table No. 3
Bonds, Notes and Debentures
Weighted Current Cost

Railroad Co.	Weight	Current Cost
CSX	31.16 %	2.664 %
NSC	25.67	2.724
UNP	43.17	2.444
Total	100.00 %	2.585 %

As noted earlier, the current cost for bonds, notes, and debentures is based on traded instruments issued by the sample railroads. Appendix A contains the average yield for each of the 126 securities that traded according to Bloomberg's database. The average yield for each security is a simple average of the twelve month-end yields. The traded portion of Appendix A (in the front section) summarizes the yield, or cost of each railroad's debt, which, when weighted by the market value of the traded debt, determines the sample composite cost of bonds, notes and debentures of 2.585 percent. The weights used in Table 3, as derived from the calculations in Table 2, are also based on the traded portion of bonds, notes and debentures listed in Appendix A.

B. Equipment Trust Certificates

Equipment Trust Certificates (ETCs) are debt obligations that are secured by the particular equipment which is acquired with the instrument's proceeds. In the event of default, creditors may repossess and resell or lease the equipment to pay off the debt obligations. This type of security has declined in popularity. In the 1990 cost of capital determination, ETCs accounted for 17.70 percent of the market value for the sum of bonds, ETCs, and conditional

sales agreements.[13] For 2021, this percentage is 1.45 percent. Because entire ETCs are not actively traded in secondary markets, it is necessary to determine their cost by examining the return on other debt securities that are actively traded.

An ETC is generally serially issued. As such, each year during its life an equal amount (typically 1/15th) of the original amount must be retired. Consequently, an ETC may be thought of as a series of individual, annually-retiring bonds. In fact, when ETCs are issued, each of the maturities is sold independently from the others. A serially issued debt instrument provides an investor with the ability to purchase only those maturities of particular interest. To correctly compute the composite yield on a serially issued bond, the internal rate of return on the bond's principal and interest payments must be calculated.

To compare ETCs to other debt instruments, the yields to maturity (as detailed in Appendix B) for government bills, notes, and bonds having the same range of maturities as current ETCs were obtained from Federal Reserve data. The yield curve for these government securities (also in Appendix B) shows the relationship between the current costs, or yields to maturity, and maturity dates for government bonds (which, unlike ETCs, are actively traded in secondary markets).

These yield data have been adjusted by the Federal Reserve Board to reflect constant maturities, such that the data accurately reflect the 2021 relationships between yields and maturities. After determining the yields to maturity for government bonds of maturities similar

[13] See Table 1 in ICC Ex Parte No. 491, decided June 12, 1991. Conditional Sales Agreements accounted for an additional 2.46 percent of debt in the market value calculation.

to those of an ETC, those yields are adjusted to reflect the risk associated with the ETCs as compared to government bonds. This adjustment is the risk premium for railroad ETCs, which is the spread between ETCs and government securities.

In 2014, 2015, and 2016, a railroad issued new ETCs with interest rate spreads above government bonds of 76, 44, and 70 basis points, respectively. Since there were no new ETCs issued in 2017, 2018, 2019, 2020, and 2021, the 70 basis point spread is our most recent calculation, and I have used that difference for 2021. For comparisons, Table 4 lists historical spreads used since 2001 and the spread proposed for 2021.[14] Other than the spread for 2015, which appears to be an anomaly, the spread of 70 basis points is the lowest spread used in this century.

[14] The 70 basis point spread was calculated using the same method as that used for 2008, 2010, 2014, 2015, and 2016, and calculations were included in my work papers submitted with each of my verified statements.

Table No. 4
History of Premiums for
Equipment Trust Certificates (ETC)

Data Year	Proceeding	Basis Points
2001	Ex Parte No. 558 (Sub-No. 5)	114
2002	Ex Parte No. 558 (Sub-No. 6)	114
2003	Ex Parte No. 558 (Sub-No. 7)	114
2004	Ex Parte No. 558 (Sub-No. 8)	114
2005	Ex Parte No. 558 (Sub-No. 9)	114
2006	Ex Parte No. 558 (Sub-No. 10)	114
2007	Ex Parte No. 558 (Sub-No. 11)	125
2008	Ex Parte No. 558 (Sub-No. 12)	125
2009	Ex Parte No. 558 (Sub-No. 13)	80
2010	Ex Parte No. 558 (Sub-No. 14)	80
2011	Ex Parte No. 558 (Sub-No. 15)	80
2012	Ex Parte No. 558 (Sub-No. 16)	80
2013	Ex Parte No. 558 (Sub-No. 17)	80
2014	Ex Parte No. 558 (Sub-No. 18)	76
2015	Ex Parte No. 558 (Sub-No. 19)	44
2016	Ex Parte No. 558 (Sub-No. 20)	70
2017	Ex Parte No. 558 (Sub-No. 21)	70
2018	Ex Parte No. 558 (Sub-No. 22)	70
2019	Ex Parte No. 558 (Sub-No. 23)	70
2020	Ex Parte No. 558 (Sub-No. 24)	70
2021	Proposed for EP 558 (Sub-No. 25)	70

The methodology used to determine the cost of ETC debt is the same as the method employed and approved in previous proceedings. Risk-adjusted yields provide the basis to value each ETC. Using formulae suggested by *Standard Security Calculation Methods,* the market value of each maturity comprising an ETC is determined. In effect, these formulae make it possible to determine the price investors would pay in 2021 for the contractual interest payments and price appreciation for holding the instrument. It is the most accurate way to compute the current cost of ETCs to the firm for the defined period. Computing the internal rate of return of the ETC prices and their associated cash flow streams establish the current

cost for ETCs. The weighted-average cost for all modeled Equipment Trust Certificates (now 4) is shown in Table 5.[15]

Table No. 5
Summary of Equipment Trust Certificates Modeled for 2021
($000)

Railroad	Amount Outstanding Beg.	Ending	Average	Yield	Current Market Value	Current Interest Amount	No. ETC
CSX	$0	$0	$0	--	$0	$0	0
NS	0	0	0	--	0	0	0
UP	880,688	843,617	862,153	1.692%	905,627	15,321	4
Total	$880,688	$843,617	$862,153	1.692%	$905,627	$15,321	4

Weighing each railroad's yield (there was only one railroad) by its current market value for modeled ETCs results in a current cost of 1.692 percent. The average rate is higher than the 1.397 percent found for 2020. In this year's case, the premium used in the model is the same as last year – so the higher yield curve for 2021 reflects the higher interest rates on government securities. (See Appendix B). Appendix C lists each ETC, and includes a market value and a

[15] The formulae used to value these bonds are standards of the security industry. They are:

For bonds with less than six months to maturity:

$$DP = \left[\frac{100 + C/2}{1 + DY/360}\right] - \left[C/2\ \frac{(180 - D)}{180}\right]$$

For bonds with six months or longer to maturity:

$$DP = \left[\frac{100}{(1 + Y/2)_{\text{EXP}}(N - 1 + D/180)}\right] + \left[\sum_{k=1}^{N} \frac{C/2}{(1 + Y/2)_{\text{EXP}}(K - 1 + D/180)}\right] - \left[C/2\frac{(180 - D)}{180}\right]$$

Where:
- DP = Dollar price of the bond
- C = Coupon rate as a percent per year
- D = Number of days from settlement date to coupon date
- Y = Yield to maturity as a decimal per year
- EXP = Raise the term on the left to the power indicated by the term on the right
- N = Whole number of coupons payable plus 1
- K = Compute for K, values 1 to N and sum the results

current yield for those modeled. (Union Pacific is the only railroad using ETCs currently.) Appendix C also lists ETCs that were not modeled (and those current, which are not used). There were no current ETCs this year. ETCs can fail to be modeled for two reasons: (1) the ETC instrument does not have all of the characteristics typical of an ETC; or (2) the ETC has a floating rate (instead of fixed) making its rate for a particular future year uncertain. There were no non-modeled ETCs this year. The market value of all modeled ETCs is $905.63 million.

C. Conditional Sales Agreements

Conditional Sales Agreements (CSAs) are another form of railroad financing that is treated by investors as debt securities, because their interest obligations are essentially the same as interest obligations on ETCs. Like ETCs, CSAs are not generally traded in secondary markets. Accordingly, as in prior proceedings, their current cost can be determined from current yields on government bonds in a similar manner to ETCs, using a 1997 relationship between CSAs and ETCs to determine the yield spread over government bonds. As in other recent years, no CSAs were outstanding in 2021 – so none were modeled and none were added to Miscellaneous Debt. No CSAs have been modeled since 2010, and none have been outstanding (non-modeled or current) since 2014. There is no appendix for CSAs.

D. All Other Debt

Capital leases and miscellaneous debt, which are normally relatively small amounts outstanding, are listed as All Other Debt. To comply with past decisions of the Board, non-modeled Equipment Trust Certificates and Conditional Sales Agreements

would have been listed in this category had there been any this year. Capital leases are the largest portion of the All Other Debt category.

Capital leases are contracts between two parties and as such take many forms.[16] Since capital leases are not traded in the marketplace, their current cost is not directly observable. The lack of complete information with respect to leases necessitates that many assumptions be made to estimate their current cost and their values. For market value purposes, capital leases are included at book value. Given the large number of these leases and the significant differences among their terms, this is the only practical option available. Because the cost of capital calculation assigns this debt a cost based on traded or modeled securities (bonds, notes, debentures, ETCs and CSAs) that typically have a lower cost, the cost used for capital leases will be somewhat understated. The book value (assumed market value) of capital leases for 2021 is $351.1 million.

Miscellaneous debt, such as floating rate loans, demand deposits, premiums/discounts, and various instruments with extremely small amounts outstanding are also excluded from the current cost computations. Miscellaneous debt is valued at negative $891.99 million because in 2021 it consists mostly of discounts and unamortized debt issuance costs.

Capital leases and miscellaneous debt net to negative $540.9 million and there were no ETCs that were not modeled. Therefore, All Other Debt as a percent of the total market value of debt of the composite railroad is negative 0.88 percent. Miscellaneous

[16] *See* generally 49 C.F.R. 1201, 2–20 for definitions.

debt is higher than it was for 2020, and much of the increase was caused by capital leases and discounts. More detail on Miscellaneous Debt can be found in the Debt Reconciliation portion of my work papers. This treatment of All Other Debt is the same approach used in the previous cost of capital proceeding.[17]

E. Market Value of Debt

Table 6 summarizes the total market value for each debt category. The total market value for traded and non-traded debt is $61,706 million.

Table No. 6
Market Value of Debt ($000)

Type of Debt	Market Value	Percent of Total	Percent of Subtotal
Bonds, Notes & Debentures	$61,340,912	99.41 %	98.55 %
Equipment Trust Certificates	905,627	1.47	1.45
Conditional Sales Agreements	0	0.00	0.00
Subtotal	62,246,539	100.88	100.00 %
All Other Debt*	-540,895	-0.88	
Total	$61,705,644	100.00 %	

* If any ETCs or CSAs are not modeled, they are included in All Other Debt.

Bonds, Notes, and Debentures (Bonds) account for 99.4 percent of the total market value. More detail can be found in Appendix D. As can be computed from that appendix, 99.3 percent of the Bonds' market value is determined by the results of trading throughout the year, while the remaining portion is based upon the book value of non-traded bonds.

[17] Non-modeled ETCs and/or CSAs would also have been included in the All Other category if there had been any.

Current costs can be determined for three of the four debt categories — Bonds, Equipment Trust Certificates, and Conditional Sales Agreements, had there been any. Therefore, in 2021, the weighted average cost of debt is based upon these three (of the four) debt categories (see subtotal column). The total market value of debt, used to determine the weight for debt in the overall cost of capital calculation, includes all four categories.

F. Flotation Costs for Debt Capital

The cost of issuing new debt generally has two portions. First, when new debt is issued by a negotiated offering or a competitive bid, the issuing firm pays a fee to the investment banking firm or firms handling the offer. These fees cover the banker's administrative costs in handling the sale and profits. Second, the issuer incurs expenses such as legal, accounting, and printing. Those types of expenses are quantified in the Securities and Exchange Commission's Form 424(b)(5) or 424(b)(2), as are the investment banker's fee and other details of new debt offerings. Flotation costs generally vary by type of security. For ETCs and CSAs, the fees are extremely small, but costs increase as the administrative burden and underwriting risk increase (i.e., in order of increasing cost — ETCs and CSAs, bonds and notes, convertible bonds, and preferred stock and common stock). As discussed below, flotation costs directly reduce the gross proceeds available to the issuing firm.

An example helps to illustrate how flotation costs permanently increase the cost of debt capital to the railroad. If a railroad sells a 10-year bond with an annual coupon of 15 percent and investors are willing to pay $98 for each $100 in face value, the effective yield on the bond is 15.40 percent. Because the investment banker requires compensation (flotation costs) for

his work, the railroad does not receive the full $98 from the investors. In addition, the railroad will have its own internal costs such as legal and accounting. If flotation costs reduce the net proceeds to say $96, the effective cost to the railroad over the life of the bond is 15.82 percent. Therefore, flotation costs have increased the cost of debt from 15.40 to 15.82, or by 42 basis points. Proper accounting treatment requires the $4 per $100 ($100 - $96) to be amortized on a straight line basis over the life of the bond. In addition, the Uniform System of Accounts requires the annual amortization to be charged directly to Account No. 548, Amortization of Discount on Funded Debt, a fixed charge item. This results in fixed charges for the year totaling $15.40 ($15.00 coupon payment + amortization of $0.20 discount + $0.20 flotation costs). It is important to note that these flotation costs are not recovered through operating costs but are fixed charges each year during the life of the bond. Also, it is evident that in order to reflect the total current cost of debt, flotation costs must be included.

Any firm requires the opportunity to cover flotation costs before it will have an incentive to make future capital expenditures. Before creditors will lend their funds, they must be assured that the railroad will have the opportunity to earn returns sufficient to cover all costs.

Using the same methodology used since 2008, I calculated 2021 flotation costs for bonds using publicly available data from electronic filings with the Securities and Exchange Commission (SEC).[18] The filing types are "Prospectus Rule 424(b)(2)" and "Prospectus Rule 424(b)(5)". In addition to standard bond information such as coupon and maturity date, these

[18] The SEC's EDGAR (Electronic Data Gathering, Analysis, and Retrieval) system is available on the internet at the following address: https://www.sec.gov/edgar.shtml .

filings also provide the price to investors, underwriter's fee, and railroad expenses excluding the underwriter's fee. I have calculated a yield based on the price to investors and a yield that also included flotation costs. The difference between the two yields is the flotation cost expressed in percentage points. For 2021, 8 new issues were reported in four filings, with some filings reporting multiple new issues. A simple average of the 8 flotation costs is 0.060 points, which is .003 higher than the figure used by the Board for 2020. As before, debt exchanges have not been included. Pages 1 and 2 of Appendix E contain a table with input data and calculations. Pages 3 and 4 of the same appendix contain, as an example, the pages from the SEC filing that were used as a source for one of the filings. The source filings for all of the new bond issues have been included in my work papers. I believe the 8 new railroad debt issues, which were issued by two different railroads, provide the best information to determine flotation costs for 2021, and I have therefore used 0.060 percentage points for the flotation costs for bonds.

Flotation costs for ETCs have much less significance compared to bonds simply because ETCs are less than 2 percent of the market value of the debt used to determine the current cost of debt. I have calculated flotation costs for ETCs using the same methodology used in the previous Cost of Capital decision, although it has some flaws. See my testimony for 2012 for a discussion of the incorrect assumption used with the current method. Because ETCs are such a small portion of total debt, this flawed method for estimating flotation costs for ETCs does not affect the cost of debt, so I have not expended resources with an alternative method.

The Securities and Exchange Commission (SEC) conducted a study of flotation costs using railroad ETC data for the years 1951, 1952 and 1955.[19] In that study, the SEC determined that ETC flotation costs averaged 0.89 percent of gross proceeds. My calculation uses this old study, the flawed assumption about average railroad yields, and assumes the duration is 15 years. This methodology, suggested by a third party in 2008, was first approved by the Board in its cost of capital for 2007 decision served September 26, 2008.

Table 7 below calculates flotation costs for ETCs using the flotation percent of gross proceeds discussed above. No flotation costs have been calculated for CSAs, as none have been modeled.

Table No. 7
Flotation Costs for
Equipment Trust Certificates

Given	**ETC**
Flotation Costs as Pct of Gross Proceeds	0.890%
Avg. Railroad Yields (Table 5)	1.692%
Assumed Duration of New Instrument (Yrs)	15
Calculated	
Price After Flotation Costs	$99.11
Effective Yield Including Flotation Costs	1.760%
Difference Between Yields With and Without Floatation Costs =	
Flotation Cost as Percentage Points	**0.068%**

In this calculation, current average yields on railroad ETCs are assumed to be equal to the yield resulting from the price to investors for a new issue (a flawed assumption because the

[19] *Cost of Flotation of Corporate Securities 1951-1955,* Securities and Exchange Commission, June 1957.

current yields and new issues are on *different places in the yield curve*). Coupons are assumed to be paid twice per year. The duration for new ETCs is assumed to be 15 years. Given the input data, effective yields can be calculated, and the difference between the yields excluding flotation costs and the yields including flotation costs are the flotation costs measured in percentage points. The results are flotation costs for ETCs of 0.068 percentage points – which is .001 percentage points higher than the value for 2020 and closer to the current flotation cost for bonds.

To compute the overall effect of flotation cost on debt, the market value weight of the debt outstanding is multiplied by the respective flotation cost. The weights for each type of debt are based on market values for debt (excluding All Other Debt), as found in the Percent of Subtotal column in Table 6. All Other Debt is excluded from the weight calculation, since a current cost of debt for that category has not been determined. As shown in Table 8, flotation costs increase the cost of debt by 0.060 percentage points.

Table No. 8
Flotation Costs For Debt

Type of Debt	Market Weight	Flotation Cost
Bonds, Notes & Debentures	98.55%	0.060%
Equipment Trust Certificates	1.45%	0.068%
Conditional Sales Agreements	0.00%	not calculated
Total	100.00%	0.060%

This flotation cost for 2021 is 0.003 percentage points higher than the number used by the Board in its 2020 Cost of Capital decision. Since bonds have a market weight of over 98 percent, flotation costs for total debt rounds to the same number as the flotation costs for bonds.

G. Conclusion as to the Cost of Debt Capital

To determine the overall composite current cost of debt, the current cost of each of three categories of debt (Bonds, ETCs and CSAs) is multiplied by its market value proportion. Market values are properly used in this connection, because they represent the amounts on which the current cost must be paid. Table 9 shows the results of this calculation.

Table No. 9
Composite Current Cost Of Debt

Type of Debt	Market Weight	Current Cost
Bonds, Notes & Debentures	98.55%	2.585%
Equipment Trust Certificates	1.45%	1.692%
Conditional Sales Agreements	0.00%	--
Subtotal	100.00%	2.572%
Flotation Costs		0.060%
Weighted Cost of Debt		2.632%
Weighted Cost of Debt (Rounded)		**2.63%**

The current weighted cost of debt before flotation costs is 2.572 percent. The addition of flotation costs results in a rounded cost of debt of 2.63 percent. This cost of debt is higher than the 2020 record low of 2.54 percent.[20] A summary for the 2021 calculation of the overall cost of debt is provided in Appendix F. That appendix also has some historical costs of debt for comparisons.

[20] The AAR's *Railroad Facts* book lists the cost of debt decided by the Board and its predecessor. The 2013 edition contains, on page 19, data from 1978 through 2012. The 2021 edition lists, on page 20, data from 1990 through 2020.

IV Common Equity Capital In 2021

A. The Market Value of Common Equity Capital

The market value of common equity is based on stock prices and shares outstanding for 2021. Table 10 below summarizes the market value calculation. The Weight column, which is not used directly in our calculation, is provided as additional information.

Table No. 10
Average Market Value
For Common Equity in 2021

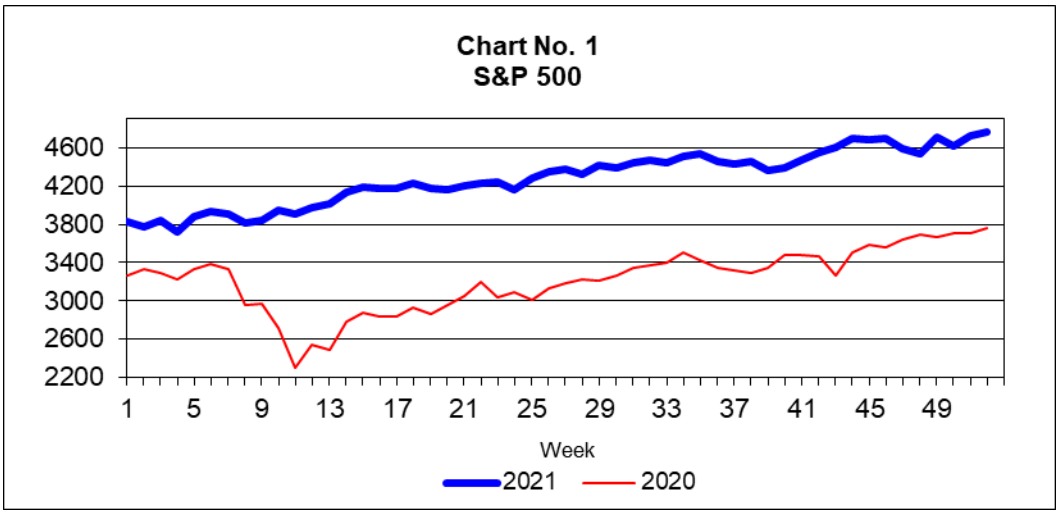
Railroad Co.	Value ($000)	Weight %
CSX	74,089,163.6	25.84
NSC	66,314,624.6	23.13
UNP	146,298,018.5	51.03
Total	$286,701,806.6	100.00 %
Prior Year	$244,578,596.0	
Change	17.2%	

Details of the calculation are presented in Appendix G. Weekly market values were calculated for each railroad using shares outstanding data from railroad 10-Q and 10-K reports multiplied by stock prices at the close of each week in 2021.[21] Note that the week beginning on March 29 ends on Thursday April 1 because of the Good Friday holiday. Thus, any railroad shares outstanding change effective on April 2 would not happen until the following week because the market was closed on April 2. The week beginning on December 20 ends on Thursday December 23 because of the Christmas holiday. Page 6 of Appendix G lists all full-day

[21] The 10-Q and 10-K reports are filed with the US. Securities and Exchange Commission (SEC) and are available from railroad web sites or the SEC web site.

stock market holidays. Page 5 of the appendix lists the holiday that caused any week to not begin trading on a Monday or end trading on a Friday. Calculations for 2021 included 52 weeks. Week 1 began on Monday January 4, 2021, and is the first week after 2020's week 52 used in last year's calculation. The week beginning Monday December 27, 2021, qualifies as the final week for 2021. Thus, 2021 is a 52-week year for the purpose of calculating the market value of common equity.

The 52-week average market capitalization of the composite railroad (the three railroads that comprise the composite sample), listed in Table Number 10 and on page 5 of Appendix G, is $286.7 billion. This is a 17.2 percent increase from last year's average.



As shown in Chart 1, the stock market in general, as represented by the Standard & Poor's 500, was also higher in 2021 than it was in 2020.

B. The Capital Asset Pricing Model (CAPM)

The cost of equity is a measure of investor expectations, including the opportunity cost of investing in a share of a firm's stock; i.e., the expected rate of return that investors require on the market value (purchase price) of the stock in light of alternative investment opportunities of comparable risk. Because investor expectations are not directly observable, analysts have developed methods of inferring the cost of equity from available financial data. There are several methods available to estimate the cost of equity. Two of these methods, the Capital Asset Pricing Model (CAPM) and a Multi-Stage Discounted Cash Flow model (MSDCF) are used in this statement to compute an estimate for the cost of equity — in accordance with STB Ex Parte No. 558 (Sub No. 25). The CAPM is discussed herein, and the MSDCF is discussed in the next section.

The theory underlying the CAPM is that an investor seeks a risk-free return plus a premium that is dependent upon risk. Since all of the principal elements of the CAPM (the risk-free rate, the market risk premium, and the beta) are estimated using historical data and relationships computed from that data, the CAPM is essentially a backward look at how equity markets have regarded a particular firm or group of firms. In formulaic terms, the cost of equity as estimated by the CAPM may be expressed as:

$$K = RF + beta\ (MRP)$$

Where K = the firm's cost of equity,
RF = the risk-free rate,
MRP = the market's risk premium, and
beta = the coefficient of systematic, non-diversifiable risk of the stock.

Therefore, each firm's cost of equity above the risk-free rate depends on the market risk premium adjusted for the non-diversifiable risk of its common stock, with the adjustment factor represented in the model as beta. The risk-free rate (RF) is typically represented by the rate of a U.S. Government (Treasury) instrument. The market risk premium (MRP) is the expected future difference between returns for the overall stock market and risk-free returns. That expected difference is typically estimated using historical differences. Beta is the coefficient of systematic, non-diversifiable risk of the stock, which depends on its volatility and its correlation with the overall stock market. The beta for the overall stock market is 1.0. Firms with higher risk will have a beta above 1.0, while firms with lower risk will have a beta below 1.0. As with the market risk premium, betas are also typically estimated using historical relationships. The methodology used for the CAPM calculation — including details for using certain inputs — follows the methodology prescribed and used by the STB in the 2020 Cost of Capital decision.[22]

1. Risk-Free Rate (RF)

In all decisions regarding the CAPM, the Board has specified a risk-free rate based on an average yield to maturity for a 20-year U.S. Treasury Bond. The average yield-to-maturities for U.S. Treasury Bonds are available from the Federal Reserve web site, and I have again utilized this resource to retrieve data for 2021.[23] A copy of the "download" from the Federal Reserve web site is included in my work papers. Table 11 lists a 10-year history of this bond. As the

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[22] *Railroad Cost of Capital – 2020,* EP 558 (Sub-No. 24) (STB served August 6, 2021).

[23] Federal Reserve's new web site is https://www.federalreserve.gov/datadownload/Choose.aspx?rel=H15. For Data set, choose Selected Interest Rates. For Instrument, select U.S. government securities/Treasury constant maturities/Nominal. For Maturity, select 20-year. For Frequency, select Annual.

table shows, the average rate for 20-Year U.S. Treasury Bonds in 2021 is an increase from the previous year. Appendix H lists all of the annual 20-Year U.S. Treasury Bond rates available since 1980. The 20-year rate for 2020 was the lowest rate during that period, and 2021 is the second-lowest.[24]

Table No. 11
20-Year U.S. Treasury Bonds 2012 - 2021

Year	Average Annual Rate
2012	2.54 %
2013	3.12
2014	3.07
2015	2.55
2016	2.22
2017	2.65
2018	3.02
2019	2.40
2020	1.35
2021	1.98

Source: Federal Reserve

Using the average yield to maturity in 2021 for a 20-year U.S. Treasury Bond, as directed in STB Ex Parte No. 558 (Sub No. 25), the CAPM's risk-free rate is 1.98 percent.

[24] The Federal Reserve Board has two series for 20-Year Treasury Bonds. The first data set is from 1962 through 1986. The second set has data from 1993 to current. Rates from the two data sets are listed in my work papers. There are no data for 1987 through 1992.

2. Market Risk Premium (MRP)

In previous decisions, the STB has required that the market risk premium (a.k.a. equity risk premium) calculation begin with year 1926, which is a standard approach. The Standard & Poor's 500 Index is to be used as the representative of the market — also a standard approach. The STB's decision also stated that the "data are also available from a variety of commercial vendors, including Ibbotson."

In the 2006 through 2012 Cost of Capital determinations, the well-regarded and widely-accepted Ibbotson Equity Risk Premium was used. The premium was listed in the *Ibbotson SBBI Valuation Yearbook* published by Morningstar.[25] This premium is the long-horizon equity risk premium, using the S&P 500 and data beginning with 1926. Although Morningstar discontinued its *Ibbotson SBBI Valuation Yearbook,* it published the same long-horizon equity risk premium in the *Ibbotson SBBI Classic Yearbook.* This source was used for 2013 and 2014 equity risk premiums.

In 2015 and 2016, yet another source of data was needed, as Morningstar decided to discontinue its *Ibbotson SBBI Classic Yearbook.* The valuation and financial advisory firm Duff & Phelps maintains many of the same series formerly published by Ibbotson, and their *Valuation Handbook-U.S. Guide to Cost of Capital* included a page that listed the long-horizon expected equity risk premium.[26] The Duff & Phelps *Valuation Handbook-U.S. Guide to Cost of Capital* was

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[25] Ibbotson Associates is a wholly-owned subsidiary of Morningstar, Inc. "SBBI" stands for "Stocks, Bonds, Bills, and Inflation.

[26] The Duff & Phelps *2017 Valuation Handbook – Guide to Cost of Capital* was published by John Wiley & Sons. The handbook listed the premium on page 36 of chapter 3 (and page 14 of chapter 5). The last

the source used to obtain the 2015 and 2016 equity risk premiums. In 2018, however, Duff & Phelps decided to discontinue the publication of that book in hardcover form, which would have been used as the source for the 2017 equity risk premium. Although the physical book is no longer be published, Duff & Phelps has developed an online tool called the *Cost of Capital Navigator*, and the data that would have been published in the *Valuation Handbook-U.S. Guide to Cost of Capital* are available in the online *Cost of Capital Navigator*.[27] The *Cost of Capital Navigator* contains the "Long-horizon expected equity risk premium (historical)", which is calculated using "large company stock total returns minus long-term government bond income returns", beginning 1926. This premium is calculated using the same method as that used by Ibbotson to calculate the market risk premiums used in previous cost of capital determinations. For 2021, the online Duff & Phelps *Cost of Capital Navigator* shows this premium as 7.46 percent (note that Duff & Phelps is now a Kroll company). This is a small increase from the 7.25 percent figure used by the Board for 2020. (Page 1 of my Appendix H shows Equity Risk Premiums since 1980, and page 2 shows a screen shot of the on-line source for the 2021 equity risk premium.) Thus, I used 7.46 percent as the rate for the CAPM's market risk premium.

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sentence of Footnote 5-16 (on page 14 of Chapter 5) in the Handbook says "The long-horizon historical equity risk premium was previously published on the "back page" of the Morningstar/Ibbotson SBBI Valuation Yearbook (discontinued)."

[27] The References section of the online *Cost of Capital Navigator* contains the same data, in the same chapter format, that would have been published in the *Valuation Handbook – U.S. Guide to Cost of Capital*. It is essentially an online book, instead of a hardcover book.

3. Beta

The STB Ex Parte No. 664 decision requires parties to calculate the CAPM's beta using a portfolio of weekly, merger-adjusted stock returns for the prior five years in the following equation:

R – SRRF = Alpha + beta (RM – SRRF) + E

Where:

R	= merger and dividend-adjusted stock returns for the portfolio of railroads;[28]
SRRF	= short-run risk-free rate represented by 3-mo. U.S. Treasury Bills;
alpha	= constant term;
beta	= coefficient of systematic, non-diversifiable risk;
RM	= return for the market, represented by the S&P 500; and
E	= random error term.

In its Railroad Cost of Capital – 2006 decision, the STB clarified its beta calculation methodology. The STB noted that "[t]he proper way to arrive at the weekly portfolio change is to calculate the weekly stock percentage change for each firm, weighted by that firm's share of the industry as a whole." The STB also determined that the Standard & Poor's 500 Price Index, which is publicly available, should be used as a proxy for the Standard & Poor's 500 Total Return Index, unless the Total Return Index is made available to the public.

Using the STB instructions, the value for beta can be solved for by using a linear regression. The railroad portfolio return less the short-term risk free rate is the dependent variable, while the market return less the risk free rate is the independent variable. The

[28] Railroads must meet the screening criteria set forth in *Railroad Cost of Capital – 1984* and modified recently by the Board in Revisions to the *Cost-of-Capital Composite Railroad Criteria*.

regression's random error term is unknown, the intercept is the alpha, and the coefficient for the explanatory variable is the beta.

The raw regression data set used in the AAR calculation has normally been derived from publicly available data from web sites on the internet (for further information, see the work papers). Due to Yahoo data quality concerns in the prior years, we used Bloomberg stock price data for 2021.

As instructed, I have used weekly stock price data for the prior five years. The raw data consists of weekly observations from the last week of 2016 (Week 0) through the last week of 2021 (Week 261). Bloomberg identifies each week in the data set by the last trading day of the week (typically Friday), which means that the stock price data and the identification of the week are the same.[29] Week 1 in the regression data set is the week ending Friday, January 6, 2017 (or beginning Monday January 2, 2017).[30] This week meets the Board's criterion to qualify as week 1 because it is the first week to contain 3 or more trading days in 2017. The last week of 2021, Week 261, began on Monday, December 27. Week 0 began in 2016 on Monday December 26, and it is *not* directly used in our regression for beta. The purpose of having a Week 0 is to be able to calculate the return for Week 1 and to have a weight for the beginning

[29] In some cases, stock did not trade on Friday. For example, trading during Week 222 ended Thursday, April 1, 2021, because Friday, April 2, 2021, was the Good Friday holiday. There are also cases where the first trading day of the week was not Monday because of a holiday. For example, Week 212 began on Tuesday, January 19, because of the Martin Luther King Day holiday on January 18.

[30] Following the Board's clarification in Ex Parte No. 558 (Sub-No. 12), the week beginning January 2, 2017, is the first week in the relevant year that contains 3 or more trading days. The previous week had no trading days in 2017.

(instead of the end) of Week 1. This enables a Week 1 return to be included in the regression data set as clarified by the Board on page 7 of its 2008 cost of capital decision.[31]

Three categories of data are necessary for the raw regression data set. First, weekly stock prices for CSX, NSC, and UNP are acquired.[32] The price index values for Standard & Poor's 500 Price Index were also downloaded. Stock prices adjusted for dividends and splits are used to calculate the regression's dependent variable, while prices that are only adjusted for splits are used for weighting.[33]

The second category of data is shares outstanding. Stock shares outstanding, and an effective date, were gathered from each railroad's 10-Q and 10-K reports. The shares outstanding data were adjusted for stock splits, if necessary. For each railroad, a shares outstanding value is assigned to each week based upon the latest available 10-Q or 10-K submissions by that railroad to the Securities and Exchange Commission.[34] In some cases, the last trading day of a week was actually a Thursday (Good Friday is always a holiday for the U.S. stock markets), and this can affect the shares outstanding used. All of the days stocks traded, and stock market holidays, are listed in my work papers.

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[31] EP 558 (Sub-No. 12), (STB served Sept. 25, 2009).

[32] CSX Corporation has a stock symbol of CSX, Norfolk Southern Corporation is NSC, and Union Pacific Corporation is UNP.

[33] The dividend-adjusted values may differ for a given week if the data are downloaded at different times during the year, especially if dividends have been paid during the interim time. The difference typically affects the fourth digit after the decimal of the beta calculations. The current data sets were downloaded January 10, 2022, and the range of data was from 12/20/2016 through 1/7/2022.

[34] Shares outstanding are updated using the first Friday on (provided the stock traded that day), or after, the effective date listed in the 10-Q and 10-K reports – since Friday's (or the end of the week) stock price is used.

The final category of raw data is the rate for 3-Month U.S. Treasury Bills. These securities are also known as 13-Week Treasury Bills or 90-Day Treasury Bills. The Treasury Bill rates are acquired from the Federal Reserve web site, and the "download" is included in my work papers.

SAS statistical software was used to prepare the regression data set from the raw data.[35] The weekly stock percentage change for each railroad was calculated and weighted by that railroad's share of the industry as a whole to create a composite railroad return.[36] Weekly returns are also calculated for the Standard & Poor's 500 Price Index (the proxy for the market as a whole). Each week's three-month Treasury Bill rate, which is the measure employed for the short-run risk-free rate, is restated from an annual to a weekly rate to make it comparable to the weekly returns. The method used to convert from an annual rate to a weekly rate accounts for compounding. The weekly Treasury Bill rates are then deducted from the composite railroad portfolio returns and market returns as was done in the previous cost of capital submissions. The resulting regression data set has 261 observations (weeks 1 through 261), since week 0 of the raw data set was used only to calculate a weighted return for week 1.

The SAS General Linear Model procedure (Proc GLM) was used to calculate the regression, with composite railroad returns less the short-run risk-free rate as the dependent variable and the market returns less the short-run risk-free rate as the independent variable. As a check against our beta calculations, a spreadsheet has also been utilized to calculate the

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[35] SAS Institute Inc., Cary, NC.

[36] Since the weight needs to be the weight at the beginning of the week instead of the end of the week, data from the end of the previous period are used to represent the beginning of the current period.

beta using a linear regression, and the results matched the SAS calculation. As specified by the STB decisions, the regression includes an intercept. Appendix I contains a summary of the regression using SAS. The beta is the estimate of the parameter shown on the bottom of the Appendix page. The entire SAS printout and a spreadsheet version are included in my work papers. The regression using the Bloomberg data resulted in a beta estimate of 1.070352088 using a spreadsheet, and 1.070363159 using SAS – both round to 1.0704.[37]

The 2021 beta is lower than the beta for 2020 (1.0741) and is the lowest since 2009. However, this is the thirteenth consecutive year that the railroad beta has been above 1.0, further demonstrating that railroad stocks are consistently more volatile and are regarded as having more risk than does the market generally.

We have evaluated our beta calculation by comparing it to previous years and expectations. The value of 1.0704 for beta, as calculated in the spreadsheet regression where we are confident of data quality, and using SAS, is used as an input to the CAPM.

4. Cost of Common Equity Using the CAPM

A review of the Capital Asset Pricing Model (CAPM) is as follows:

K = RF + beta (MRP)

Where K = the cost of equity for the portfolio of railroads,
RF = the risk-free rate,
MRP = the market's risk premium, and
beta = coefficient of systematic, non-diversifiable risk.

[37] Differences between the SAS regression and the spreadsheet regression were probably caused by the number of digits after the decimal allowed in the data sets by the two software packages.

Our CAPM used the methodology used by the STB in the previous cost of capital determination, Ex Parte No. 558 (Sub-No. 24). Table 12 is a summary of our CAPM cost of common equity calculation, which resulted in an average 2021 cost of equity estimate for the composite railroad of 9.97 percent. This is an increase from 2020's 9.14 percent.

Table No. 12
Cost of Common Equity
Using STB's Capital Asset Pricing Model

Inputs to Model	**2021**	**2020**	
Risk-Free Rate	1.98 %	1.35 %	Table No. 11
Market Risk Premium	7.46	7.25	Appendix H
Beta	1.0704	1.0741	Appendix I
Calculation			
Risk-Free Rate	1.98	1.35	Given
Plus: Beta Adj. Risk Premiun	7.99	7.79	Beta x MRP
CAPM Cost of Equity	9.97 %	9.14 %	RF Rate + Prem.

C. The Multi-Stage Discounted Cash Flow Model

As stated earlier, there are several methods available to estimate the cost of equity. The Multi-Stage Discounted Cash Flow Model (MSDCF) is another model available. Using this model, the cost of equity is the discount rate that equates a firm's market value to the present value of the expected stream of free cash flow that is potentially available for distribution to equity investors. The multiple stage portion of the model accounts for the assumption that the firm will not experience a constant growth rate throughout its life. These features make the MSDCF somewhat more forward looking in that it relies on the expectations of the equities markets as to the firm's future performance although its accounting treatment of cash flows

remains grounded in historic relationships. Thus, its theoretical basis contrasts dramatically with the historic view of the CAPM, and brings investor perceptions of the firm's future into the process of estimating its cost of equity. As such, estimations of the cost of equity using MSDCF more closely align with section 16 of the Surface Transportation Board Reauthorization Act of 2015, which directed the agency to consider current and future conditions when evaluating railroad revenue adequacy, a key function of the STB's cost of capital calculation.

The STB, in Ex Parte No. 664 (Sub No. 1), adopted the Morningstar/Ibbotson MSDCF model to use for estimating the cost of common equity capital.[38] This model assumes that investor cash flows do not all have to be in the form of dividends. Instead, investors benefit from regular dividends, special dividends, stock buybacks, or stock price appreciation.[39] Major inputs to the model include cash flows, expected growth rates, and market values. An equation for this model can be found in Appendix J. A firm's present value as determined by the market is therefore equal to the sum of the present value of three sets of future cash flows. This is the same formula that appeared in the Appendix to the Board's decision in Ex Parte No. 664 (Sub-

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[38] The Morningstar/Ibbotson MSDCF model adopted by the Board in Ex Parte No. 664 (Sub-No.1) is a modified version that includes only the railroads that pass the screening criteria set forth in Railroad Cost of Capital – 1984, 1 I.C.C. 2d 989 (1985), for inclusion in the sample of railroads used for the annual cost of capital determination. See Ex Parte No. 664 (Sub-No.1), *Use of a Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry's Cost of Capital,* served January 28, 2009.

[39] One interested party believes that stock repurchases (buybacks) bias the MSDCF *upwardly*. However, stock repurchases have the opposite effect – they bias the MSDCF *downward*. The MSDCF does not fully reflect the reality that distributions to shareholders (buybacks) mean cash flows to investors are shifted forward in time, and earlier cash flows should raise cost of equity estimates since the present value of a dollar received today is always (unless we have deflation) greater than the present value of that same dollar received at some future date. Since the model cannot account for this shift forward in cash flows, it is likely to understate the cost of equity. See September 5, 2014, verified statement of Dr. Bente Villadsen on behalf of Association of American Railroads in Ex Parte No. 664 (Sub-No.2)

No.1) served August 11, 2008, and it is the same formula found in the AAR's submissions for the 2008 through 2020 cost of capital.

1. Cash Flows

The Morningstar/Ibbotson MSDCF model uses an initial cash flow and a terminal cash flow as inputs. The initial cash flow is defined as income before extraordinary items minus capital expenditures plus depreciation plus deferred taxes. Income before extraordinary items (IBEI) is derived by deducting extraordinary items from net income. Thus, the model's formula for cash flows is as follows:

$$CF = (NI - EI) - CAPEX + DEP + DT$$

Where CF = cash flow,
NI = net income,
EI = extraordinary items,
CAPEX = capital expenditures,
DEP = depreciation, and
DT = deferred taxes.

The Morningstar/Ibbotson MSDCF model utilizes five-year moving averages for each railroad. The years used in this case are 2017 through 2021. Data are copied from the Consolidated Cash Flow and Income Statement of each railroad's annual 10-K report, and any changes to prior years have been incorporated. The 10-K reports, which are filed with the Securities and Exchange Commission, are usually available each year around February. In addition to the data points listed above, sales (a.k.a. revenue) is used as part of a smoothing (or averaging) process. Table 13 illustrates the Morningstar/Ibbotson process to calculate an average cash flow. Revenue, Net Income, and Extraordinary Items are sourced from the

Income Statement. Depreciation, Deferred Taxes, and Capital Expenditures are sourced from the Statement of Cash Flows. Net Income and Deferred Taxes for 2017 have been adjusted, using the same data and methodology as the Board used in its 2017 Cost of Capital determination, to remove the accounting impacts of the Tax Cuts and Jobs Act on rail carriers' deferred tax liability. Part of the increases in Net Income after 2017 was caused by the reduction in the corporate income tax rate.

Table No. 13
Example Cash Flow Calculations for CSX in 2021
($ in millions)

	2017	2018	2019	2020	2021	Total
Net Income	$1,840	$3,309	$3,331	$2,765	$3,781	$15,026
Less Extraord. Items	0	0	0	0	0	0
Inc. Bef. Extraord. Items (+)	$1,840	$3,309	$3,331	$2,765	$3,781	$15,026
Capital Expenditures (-)	$2,040	$1,745	$1,657	$1,626	$1,791	$8,859
Depreciation (+)	1,315	1,331	1,349	1,383	1,420	6,798
Deferred Taxes (+)	209	279	273	180	167	1,108
Cash Flow	$1,324	$3,174	$3,296	$2,702	$3,577	$14,073
Revenue (a.k.a. "Sales")	$11,408	$12,250	$11,937	$10,583	$12,522	$58,700

Ratio of Cash Flow to Sales (Smoothed Ibbotson-style) = ($14,073 / $58,700) =	0.23974
Initial Cash Flow in 2021 (Smoothed Ibbotson-style) = (0.23974 x $12,522) =	**$3,002.08**
Ratio of IBEI to Sales (Smoothed Ibbotson-style) = ($15,026 / $58,700) =	0.25598
Terminal Cash Flow input (Smoothed Ibbotson-style) = (0.25598 x $12,522) =	**$3,205.38**

After the financial data are collected, they are combined (Total column in the example) into a five-year cash flow for the purpose of averaging or smoothing. The average cash flow for 2021, which is the initial cash flow in the model, is calculated by multiplying revenue for 2021 times the five-year average ratio of cash flow to revenue. In our example here, the model's input for the initial cash flow is $3,002.08 million. The ratio of cash flow to sales is calculated by dividing the five year total cash flow by the five year total revenue.

The model's terminal cash flow value is based on the assumptions that in the third stage of the model, depreciation equals capital expenditures, and deferred taxes are zero. Therefore, the depreciation and capital expenditures from the initial cash flow formula cancel each other, and deferred taxes are eliminated because they are zero. The remaining part of the equation for the model's terminal cash flow is income before extraordinary items (IBEI), which we calculate by subtracting extraordinary items from net income. In our Table 13 example, the model's input for the terminal cash flow is $3,205.38 million. The model's terminal cash flow input is calculated by multiplying revenue for 2021 times the five-year average ratio of income before extraordinary items to revenue. The ratio of income before extraordinary items to sales is calculated by dividing the five-year income before extraordinary items by the five-year total revenue.

All cash flow calculations herein have been calculated using the same procedure used by the STB for the previous cost of capital determination. Appendix K contains the cash flow calculations for all three railroads, including more detail on the adjustments made to 2017 data to remove the accounting impacts of the Tax Cuts and Jobs Act on rail carriers' deferred tax liability. The pages from the 2021 10-K reports that were used as data sources for cash flows are included in my work papers. Data for prior years (2017-2020) used in this year's calculation are unchanged from last year's submission[40] – unless restated/revised data were found in the 2021 10-K statements.

[40] Excepting where necessary to remove Kansas City Southern from prior year computations.

2. Growth Rates

The first stage of the Morningstar/Ibbotson MSDCF model applies to a period that is one to five years in the future. The current year (2021) is considered to be year 0. In each year of the first stage, a firm's annual earnings growth rate is assumed to be the median value of the firm's three- to five-year growth estimates that are made by railroad industry analysts after the release of the year-end financial statements. However, in Ex Parte No. 558 (Sub No. 12), the STB clarified their interpretation of the Morningstar/Ibbotson MSDCF model by specifying use of data in effect at the end of the current year as the date for growth rates, stock prices, and stock shares outstanding.[41] (Clearly, the Board's interpretation does not anticipate the use of growth estimates based on the release of audited year-end financial statements.) In Ex Parte No. 558 (Sub No. 16), the STB made another clarification in their interpretation of the Morningstar/Ibbotson MSDCF model by specifying the *last full week of the year* as the point from which stock prices should be used. Therefore, we have utilized growth rate projections that were in effect at the end of 2021, and stock prices as of December 31, 2021 – the prices at the end of the last full week for 2021.[42] Each growth rate projection was reviewed by the brokerage firm's analyst during 2021, and the stock prices were retrieved from Yahoo! Finance.

For many years, analyst growth rate estimates were collected, and distributed, by the Institutional Brokers Estimate System (a.k.a. IBES or I/B/E/S). In recent years, the IBES growth rates have been distributed by Thomson Financial (now called Refinitiv) through its Eikon

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[41] *Railroad Cost of Capital – 2008*, EP 558 (Sub-No. 12) (STB served Sept. 25, 2009).

[42] Friday, December 31, 2021 was the last trading day for the week.

service.[43] Although the term "IBES" is rarely used by Thomson, many users of the data still refer to these growth rates as "IBES" growth rates. Thomson Financial has also distributed medians of the IBES growth rate estimates on a historical basis through its Thomson ONE Banker service. The median estimates provided through the Thomson ONE Banker service did not always reflect the full set of growth rate estimates. Therefore, I have utilized all estimates available from the Refinitiv/Thomson Reuters Eikon service, and determined medians based on that data. These growth rates are described in the Thomson Financial Glossary as the expected annual increase in operating earnings over a company's next full business cycle. A worktable and the source data are included in Appendix L. Table 14 lists the median growth rate estimates.

Table No. 14
2021 Thomson Median Growth Rate Estimates

Company	Stock Symbol	Growth Rate
CSX Corporation	CSX	17.70 %
Norfolk Southern Corporation	NSC	18.00
Union Pacific Corporation	UNP	16.99
Simple Average		17.56

Thus, the median growth rate estimates have been retrieved using the same procedure and source used by the AAR last year. Each individual railroad's median growth rate is used in the first stage of the Morningstar/Ibbotson MSDCF model.

The second stage of the Morningstar/Ibbotson MSDCF model applies to a period six to ten years in the future. This is *not a transition stage* where the growth rate should be

[43] In October 2018, we were notified that the Financial and Risk business of Thomson Reuters is now called Refinitiv.

smoothed between the first and third stages. Morningstar's model assumes "that over a middle horizon, growth of any particular company will lie more in line with the industry as a whole".[44] In other words, other companies "catch" their industry growth leaders, or the leaders fall back to the rate of the slower growth railroads. Therefore, in this stage, the cash flows at the end of year five are assumed to grow at the simple (not weighted) average of the individual firm medians used in the first stage. Any attempt to change the second stage to a transition stage is corrupting the intent of the model.

In Table 14, the average of the median growth rates is 17.56 percent, which is an increase from 2020 (8.49 percent), and closer to the level it was in 2018 (19.88 percent). For all railroads in the Morningstar/Ibbotson MSDCF model, a second stage growth rate of 17.56 percent is used.[45]

The third stage of the MSDCF model begins 11 years in the future and continues in perpetuity. Starting in year 11, the firm's growth rate is assumed to be the long-run nominal growth rate of the aggregate U.S. economy, which can be thought of as a combination of expected inflation plus the real growth rate in Gross Domestic Product (GDP). Until the 2013 Cost of Capital determination, the long-run nominal growth rate was supplied by Morningstar/Ibbotson in its *Ibbotson SBBI Valuation Yearbook*. In September 2013, customers subscribing to the *Ibbotson SBBI Valuation Yearbook* were notified that the publication was being discontinued. The *Ibbotson® SBBI® Classic Yearbook* (Classic Yearbook) was expanded

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[44] *Ibbotson SBBI 2013 Valuation Yearbook*, page 51.

[45] The model used an average rounded to 2 digits after the decimal.

and contained some of the data needed for the Stage 3 calculation, but it was discontinued after two years. Therefore, beginning with the 2013 determination, and then more so beginning with the 2015 determination, I have continued the original Ibbotson methodology by using data available from the Federal Reserve and Bureau of Economic Analysis. Work and data sources for this third stage of the MSDCF model are shown in Appendix M.

As summarized on page 1 of Appendix M, the long-run expected nominal growth rate of the U.S. economy (Stage 3 growth rate of the MSDCF) is the long-term expected growth rate for real GDP plus the long-term expected inflation rate. The real GDP growth rate is simply a historical compound growth rate calculated from Bureau of Economic Analysis data beginning in 1929, and it is illustrated on pages 2 through 4 of Appendix M. This procedure has been used, and accepted, since the 2013 Cost of Capital determination, and it is the same method used by Morningstar for 2008 through 2012. Page 2 of Appendix M has a replication of the Morningstar long-term real GDP growth rate calculation for 2009 through 2012, and AAR has continued this calculation (now using 2012 dollars) up to the latest year. Pages 3 and 4 of the same Appendix show data sources used on page 2. The calculation for 2021 is 3.16 percent – a slight increase from the 3.14 percent used for 2020.

The second piece of our Stage 3 calculation, expected inflation, is calculated by subtracting Inflation Indexed 20-Year Treasury Bond rates from Long-Term Government Yields (which are not inflation indexed). Work for this second piece of Stage 3 is shown on page 5 of Appendix M. Using data from the Ibbotson and the Federal Reserve, I have replicated the 2008 through 2012 Ibbotson calculations for expected long-term inflation. Beginning with the 2013 Cost of Capital determination, Ibbotson did not release a rate for Inflation-Indexed 20-Year

Bonds. However, I have been able to replicate their source,[46] and Long-Term Government yields were available from Morningstar's Ibbotson SBBI Classic yearbook. This methodology to determine expected inflation was accepted every year since the 2013 cost of capital determination.

Beginning with the 2015 Cost of Capital determination, the SBBI long-term government yields are no longer available since Morningstar no longer publishes its *Ibbotson SBBI Classic Yearbook*. In lieu of the SBBI number used for part of the calculation (that is no longer available), I have used 20-Year U.S. Treasury Bond yields at the end of the year, which are very close to the numbers used by Ibbotson.[47] This addition to the methodology was accepted in the 2015 through 2020 cost of capital determinations, and has been used again for 2021. Comparing yields for long-term government bonds to inflation indexed bonds, I calculate an expected long-term inflation rate of 2.57 percent.

Page 1 of Appendix M summarizes my calculations shown on pages 2 through 5 (with source data) of the same Appendix. Because expected real growth in output is usually very stable, changes in the Stage 3 growth rate are usually determined by changes in inflation expectations. For comparison purposes, page 6 of Appendix M shows Stage 3 rates since 2008, including the two components: the expected real growth in output (as measured by Gross Domestic Product) and expected inflation. The Stage 3 rate for 2021 is 5.73 percent (3.16 +

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[46] See Appendix M, page 5, columns (d) and (e) for a comparison of Inflation Indexed 20-Year Treasury Bonds from the SBBI compared to 20-Year Treasury Bonds at the end of the year from the Federal Reserve web site.

[47] See Appendix M, page 5, columns (b) and (c) for a comparison of Long-Term Government Yields from the SBBI compared to 20-Year Treasury Bonds at the end of the year from the Federal Reserve web site.

2.57 as also shown on page 1 of Appendix M), which is higher than the 5.20 used for 2020. Both real growth in output and expected inflation increased from the previous year, and this caused the increase in the Stage 3 Growth rate calculated for 2021. This is the same method I used for the previous year.

3. Market Values

The final inputs to the Morningstar/Ibbotson MSDCF model are the stock market values for the common equity of each railroad. The market values serve two purposes. First, a firm's market value is a necessary part of the MSDCF model. As stated earlier, each railroad's cost of equity in the MSDCF model is determined by solving for the discount rate that equates a firm's *market value* to the present value of the expected stream of free cash flow that is potentially available for distribution to equity investors.

Market values are also used to determine weights for combining the model's cost of equity for each individual railroad into the composite railroad mandated by the Board. Thus, Table 15 below calculates the market value for each railroad, and it uses the market values to calculate weights. Prices and shares outstanding are for common stock. Although weights are shown at three digits after the decimal, they have been left at full float for calculation purposes – and so they will total to exactly 100 percent.

Table No. 15
Equity Market Value on December 31, 2021

Company	Stock Price	Shares Outstanding	Market Value ($mil)	Weight
CSX	$37.60	2,217,983,411	83,396.2	26.242 %
NSC	$297.71	243,344,509	72,446.1	22.796
UNP	$251.93	642,875,700	161,959.7	50.962
Total		3,104,203,620	$317,801.9	100.000 %

As directed by the Board, I have used stock prices (from Yahoo Finance) for December 31, 2021, the last trading day of the week that qualifies as the last week of 2021 for cost of capital purposes. I have also used the shares outstanding for that day from the 2021 Q3 10-Q reports (the latest information available prior to December 31, 2021) filed with the Securities and Exchange Commission. Market value is simply each firm's stock price multiplied by its shares outstanding, and weights are based on the market values. Appendix N contains the stock price pages as retrieved from Yahoo Finance, and it also contains the 10-Q pages used for shares outstanding.[48]

4. Cost of Common Equity Using the MSDCF Model

The equation found in Appendix J provides the mathematical formula that is used to generate the three-stage DCF cost of equity estimates for each railroad. The left side of this equation is the market value of the firm in year 0. The right side of the equation is the discounted value of the cash flows from the three stages of the firm's expected future growth. Essentially, this equation is solved for each firm by simply testing discount rates (cost of equity)

[48] Although we found some errors in dividend-adjusted stock prices downloaded from Yahoo Finance when examining the data set to be used for the CAPM's beta calculation in prior years, no problems were found with regular stock prices.

in an effort to find one that causes the sum of the present values of the cash flows for the three stages to be equal to the market value at year 0. An iterative process can be used to narrow down the possible solutions to the ultimate answer, or Microsoft Excel's Solver function can be used to automate the process.[49]

Applying the methods described above, I have calculated a cost of common equity for each of the three railroads specified using a spreadsheet like the one utilized in the 2020 filing. Using an initial cash flow, an input for calculating the terminal cash flow, growth rates for each of the three stages, and a market value effective December 31, 2021, I have solved for the discount rate (cost of equity) that causes the sum of the present values of cash flows for each stage to equal the firm's market value.[50] The spreadsheet used for the calculations is displayed in Appendix O.

The resulting costs of common equity for each railroad, using the Board's MSDCF, are shown in Table 16. In the same table, I have also calculated an MSDCF cost of common equity (using weights from Table 15 and the individual railroad cost of equities) for the composite railroad, which is the current cost of equity for this model.

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[49] A commonly used Excel user's manual describes the Solver function as follows: "Solver is an Excel add-in that goes several steps further than goal seeking. It uses the same basic trial-and-error approach (known to scientific types as an iterative approach), but it's dramatically more intelligent than goal seeking." See Matthew McDonald, Excel: *The Missing Manual*, O'Reilly Media, 2005, p. 519.

[50] As noted in Appendix K, cash flow data for 2017 utilizes the Board's adjustments to net income and deferred taxes that remove the impact of the Tax Cuts and Jobs Act.

Table No. 16
Cost of Equity Using STB's Ibbotson MSDCF

Company	Weight	Cost of Equity	Weighted Calculation
CSX	26.242%	14.69 %	3.85
NSC	22.796%	13.88	3.17
UNP	50.962%	13.87	7.07
Total	100.000%		
Weighted Current Cost of Equity			**14.09 %**

Thus, the MSDCF produces a cost of common equity of 14.09 percent for 2021 – an increase from the 9.52 percent used by the Board for 2020 (2020 was the lowest ever calculated since the MSDCF began being used in 2008). Given higher interest rates, it is logical that investors expect higher returns on their investments.

D. Conclusion as to the Cost of Common Equity Capital

In the STB's Ex Parte No. 558 (Sub-No. 25) decision served February 11, 2022, the Board specified that comments "should focus … using the methodology followed in *Railroad Cost of Capital – 2020",* which means that a simple average of the estimates produced by the CAPM adopted in STB Ex Parte No. 664 and the Morningstar/Ibbotson Multi-Stage DCF Model specified in STB Ex Parte 664 (Sub No. 1) should be used. Table 17 contains the cost of common equity estimated by each model, and a simple average of the estimates. Observing the estimates for the two cost of equity models, one can notice a difference between them that is larger than that for 2015, when the two models were almost identical. In the current year's case, we believe that the CAPM would have difficulty capturing the impact of the Tax Cuts and Jobs Act. It would therefore be wrong to claim the estimate using the MSDCF was too high by wrongly assuming the CAPM was the better model. In all probability, the CAPM is too low this

year because it has no way to account for the lower corporate tax rate and increased investor expectations as the railroads incorporate new efficiency programs.[51] Once again, it should be noted that each cost of equity model has its strengths and weaknesses, and this illustrates the Board's wisdom in using more than one model to estimate the cost of common equity.[52]

The cost of common equity for 2021 is 12.03 percent, which is above the 9.33 percent decided for 2020.

Table No. 17
Cost of of Common Equity Capital

Model		
Capital Asset Pricing Model	9.97 %	From Table No. 12
Multi-Stage Discounted Cash Flow	14.09	From Table No. 16
Cost of Common Equity	12.03 %	Average

V. Preferred Equity Capital in 2021

There were no preferred stock shares outstanding for the composite railroad sample from 2002 through 2012. Beginning 2013, one of the railroad companies comprising the railroad composite sample had preferred stock outstanding, and this continued through 2020. However, that one railroad company no longer meets the criteria for inclusion in the sample, so there is no preferred stock in this year's calculation.

[51] Although the CAPM is currently favored by groups that want a low cost of equity calculation, that has not always been true. In the 1981 Cost of Capital determination, Ex Parte No. 415 decided June 11, 1982, the Interstate Commerce Commission noted that "In general, the various shipper groups dislike the use of the CAPM methodology for determining the railroads' cost of equity capital."

[52] Utility companies also believe multiple cost of equity models are appropriate, as noted in STB Ex Parte 664 (Sub-No. 2) testimony on behalf of the Association of American Railroads entered July 23, 2015.

A. Overview of Preferred Stock

Preferred stock is a hybrid security which has some characteristics of debt and some characteristics of equity. The general characteristics of preferred stock are as follows:

1. It is an equity security similar to common stock in that it represents ownership in the corporation.
2. It has dividend preference over common stock in that it has prior claim on the corporation's earnings before dividends are paid to holders of common stock.
3. It is a security which typically has a stated rate of return or fixed dividend. (If the stock has a par value, it will state the annual dividend payments in terms of percentage of par value – for example, a 6 percent preferred. No-par value preferred stock has a dividend stated in a dollar amount, for example, a $6 preferred.)
4. It is a security that pays dividends only if they are declared by the board of directors. (If there are no earnings, the dividends may be paid out of earned surplus. In any event, dividends must be declared by the board.)
5. It has prior claim over assets at dissolution. If the corporation is liquidated, the holders of preferred stock, like bondholders, have a prior claim on assets over common stock shareholders. Therefore, preferred stock is also referred to as a senior security.
6. Ownership privileges are limited. (Preferred stock usually carries no voting right. In most instances, it does not participate in earnings above a set amount. The preemptive right to buy new securities is limited.)
7. It generally has no maturity date or maturity value. (The exception is sinking fund preferred issues which effectively must be retired at some future date.)

There are numerous types of preferred stock. The chief distinction among different types of preferred stock is the method and amount of dividend payment to the investor. In addition, there are specific privileges related to each type. Major types of preferred stock are listed below.

1. *Cumulative* - Occasionally, a board will decide not to pay dividends. If the stock is cumulative, unpaid dividends accumulate and the total accumulated (in arrears) must be paid to the holder of cumulative preferred stock before any dividends can be paid to the common stockholders. Most preferred stocks are cumulative.

2. *Noncumulative* - When business is such that the corporation's board of directors decides not to pay dividends, holders of noncumulative preferred stock lose their dividends. These dividends cannot be claimed in the future.
3. *Participating* - Owners of participating preferred stock receive – in addition to their fixed dividend – a share in the earnings remaining after all senior securities have been paid. If any additional dividend is declared, it is generally declared along with the common stock dividend. Participating preferred stock may also be cumulative, noncumulative or convertible.
4. *Redeemable* - Preferred stock is usually callable immediately. This means that the issuer can retire the stock at any time, if the company has the necessary cash. In some instances, as with so-called sinking fund preferred, the issuer is required to redeem the stock over a specified period of time. Generally, when redemption occurs, the firm must pay a premium price to the holder of the instrument.
5. *Auction Market* - This stock represents a new variety of variable-rate preferred stock. This security is generally appropriate for corporations with "temporary" idle corporate funds. The dividends, payable every seven weeks in the case of most issues, are determined by bids from current holders and potential buyers. The Auction Market Preferred shares are redeemable at the issuer's option, in whole or in part, on or near the interest payment date.
6. *Convertible* - A preferred stock is convertible if the holder has the privilege of converting the preferred stock into common stock at specified prices. This is an advantage to the holder if the market price of common stock increases. Often the convertible preferred will sell at a premium (above conversion parity) because of the conversion feature, especially as the selling price of common issues increase. Dividends of convertible preferred stock can also be cumulative or noncumulative.

B. The Market Value of Preferred Equity Capital

The market value of preferred equity is based on stock prices and shares outstanding for 2021. Given the absence of any preferred equity, we will show the calculations in Appendix P for one more year, since it shows a comparison to last year.

Table No. 18
Average Market Value
For Preferred Equity in 2021

Railroad Co.	Value ($000)	Weight %
CSX	$0.0	0.00
NSC	0.0	0.00
UNP	0.0	0.00
Total	$0.0	0.00 %
Prior Year	$6,295.7	

C. The Cost of Preferred Equity Capital

The cost of preferred equity depends, in large part, on its specific features. Three methods for determining the cost of preferred equity capital are listed below.

1. *The Dividend Yield Method* is used when the preferred stock is not convertible and there is no specific requirement to redeem the preferred. It is also used to cost preferred issues retired or redeemed during the year. The current cost in this instance is computed by dividing the stated dividend by the current market price. This method was used for all preferred stock in the 2002 cost of capital proceeding. This was also the method used for Kansas City Southern preferred stock in 1999, which was the last time Kansas City Southern was part of the composite railroad until 2013.
2. The *Internal Rate of Return Method* is used for preferred stocks which are not convertible but are subject to a mandatory redemption schedule providing a premium over the stated/par value. The current cost is equal to rate of return which equates the current price with the present value of dividends plus the redemption price.
3. The *Common Equity Method* is used when the preferred stock is convertible at the option of the holder, and the market values of the preferred and common stock indicate that conversion is likely to occur or the conversion right is influencing the price of the preferred stock. In this case, the preferred equity has the same cost as common equity.

The preferred stock that was part of the composite railroad prior to 2021 belongs to Kansas City Southern. This stock was not convertible, and was non-cumulative. Therefore, I used the Dividend Yield Method to estimate the cost of preferred equity. This method was used for 2013 through 2020. The formula for the Dividend Yield Method is simply the annual dividends divided by the average price for the year. The cost of preferred equity is zero this year, compared to 3.42 percent in 2020.

Table No. 19
Cost of Preferred Equity Capital

Company	Weight	Cost of Equity	Weighted Calculation
CSX	0.00%	-- %	0.00
NSC	0.00%	--	0.00
UNP	0.00%	--	0.00
Total	0.00%		
Weighted Current Cost of Equity			**0.00 %**

VI. The Overall Cost of Capital In 2021

A. Determination of Market Value Weights

With more detail shown in Tables 6, 10, and 18, the average market value of debt, common equity, and preferred equity are $61.7 billion, $286.7 billion, and $0.0 million (not billion), respectively. More market value detail are provided in Appendixes D, G, and P. The figure for the market value of debt includes market values of bonds, notes, debentures, equipment trust certificates, and conditional sales agreements (if there had been any). Other debt and capitalized leases are included at their book value, because market values are difficult

to determine (in some instances book values correspond to market values) and because these other instruments are a minimal portion of all railroad debt.

Based on the market value calculations, the capital structure for 2021 has weights for debt, common equity, and preferred equity of 17.71 percent, 82.29 percent, and 0.00 percent, respectively. Table 20 contains the weights computation and a comparison to the previous year.

Table No. 20
Capital Structure and Weights

		2021		2020	
	Source Table	Market Value (mil)	Capital Structure Weight	Market Value (mil)	Capital Structure Weight
Debt	6	$61,705.6	17.71 %	$65,644.5	21.16 %
Common Equity	10	286,701.8	82.29	244,578.6	78.84
Preferred Equity	18	0.0	0.00	6.3	0.00
Total		$348,407.5	100.00 %	$310,229.4	100.00 %

The market value for debt and preferred equity decreased from the prior year, while the market value for common equity increased. Weights shifted closer to their values for 2017. Debt decreased 3.54 percentage points from 2020, while common equity increased by that amount, and preferred remains at zero.

B. The Overall Cost of Capital

Multiplying the cost of debt, the cost of common equity capital, and the cost of preferred equity capital, by their respective market value proportions, results in a 2021 overall cost of capital of 10.37 percent, as shown in Table 21. This is closer to most of the years prior to 2020, while 2020 was the lowest cost of capital ever calculated. The increase was caused by higher interest rates and the shift in capital structure.

Table No. 21
Weighted Current Cost of Capital for 2021

	Source Table	Capital Structure Weight	Current Cost
Debt	11	17.71 %	2.63 %
Common Equity	18	82.29	12.03
Preferred Equity	20	0.00	0.00
Total		100.000 %	
Weighted Current Cost of Capital			**10.37 %**

VII. Qualifications of John T. Gray

My name is John T. Gray. I am Senior Vice President, Policy and Economics for the Association of American Railroads (AAR), with offices located at 425 Third Street SW, Suite 1000, Washington, DC 20024. Among other responsibilities, my duties include the collection, analysis, and presentation of economic data related to railroads and their economic environment. One of my principal duties is conducting and supervising economic, financial, statistical and cost studies dealing with various aspects of the rail industry.

Prior to joining the AAR, I worked for Union Pacific Railroad where my most recent position was as Executive Director, responsible for the commercial relationship with other transportation carriers and ports, and for strategic policy analysis on issues involving regulatory proposals, legislation and potential litigation. I have also held marketing, planning, and operating positions with other railroads including the Southern Pacific, the Burlington Northern and the Alaska Railroad. I began my railroad career at Atchison, Topeka, and Santa Fe in their cost analysis organization. Additionally, I have also worked for ARCO Alaska.

At Southern Pacific, I was responsible for network planning, analysis, and management, as well as the company's cost analysis organization. I provided testimony on behalf of Southern

Pacific regarding the economic impact to the company of the proposed combination of the Chicago and North Western Transportation Company with Union Pacific Railroad. Later, I provided extensive testimony on the economic position of Southern Pacific during the STB's review of the merger application for Union Pacific and Southern Pacific.

I hold both a Bachelors and Masters degree in Civil Engineering from Tulane University and did post-graduate work in mathematical modeling of transportation networks and rail cost systems at Northwestern University. I have also served on the faculty at the University of Alaska, where my work included network modeling and research concerning the interrelationship of transportation and economic development.

VERIFICATION

WASHINGTON, D.C.)
) SS.

I, John T. Gray, being duly sworn, state that I have read the foregoing statement, that I know its contents, and that those contents are true as stated.

JOHN T. GRAY

Appendix A
Bonds, Notes and Debentures

Summaries

CSX Corporation **A-1**

Norfolk Southern Corporation **A-4**

Union Pacific Corporation **A-7**

Individual Bonds, Notes, and Debentures

CSX Corporation **A-10**

Norfolk Southern Corporation **A-41**

Union Pacific Corporation **A-75**

CSX Corporation
12/31/2021

	Type	Description	No.	CUSIP	Coupon Rate	Maturity Date	Amt. Outstanding ($000) Year-End	Amt. Outstanding ($000) Used	Average Price	Market Value ($ 000)	Average Yield	Interest Cost ($ 000)
						Traded						
1	Notes	CSX Corp.	1	126408HB2	3.400%	8/1/2024	$550,000	$550,000	107.564	$591,601	0.890%	$5,265
2	Notes	CSX Corp.	2	126408HD8	3.350%	11/1/2025	$600,000	$600,000	108.983	$653,899	1.210%	$7,912
3	Notes	CSX Corp.	3	126408HE6	2.600%	11/1/2026	$700,000	$700,000	106.340	$744,377	1.360%	$10,124
4	Notes	CSX Corp.	4	126408BP7	7.250%	5/1/2027	$83,312	$83,312	123.434	$102,835	2.810%	$2,890
5	Notes	CSX Corp.	5	126408BM4	7.950%	5/1/2027	$64,266	$64,266	132.198	$84,958	2.030%	$1,725
6	Notes	CSX Corp.	6	126408HH9	3.250%	6/1/2027	$850,000	$850,000	109.189	$928,102	1.610%	$14,942
7	Notes	CSX Corp.	7	12641LBU6	6.800%	12/1/2028	$200,000	$200,000	127.962	$255,924	2.600%	$6,654
8	Notes	CSX Corp.	8	126408HJ5	3.800%	3/1/2028	$800,000	$800,000	112.145	$897,163	1.840%	$16,508
9	Notes	CSX Corp.	9	126408HM8	4.250%	3/15/2029	$950,000	$950,000	115.559	$1,097,807	2.050%	$22,505
10	Notes	CSX Corp.	10	126408HQ9	2.400%	2/15/2030	$400,000	$400,000	102.797	$411,189	2.050%	$8,429
11	Notes	CSX Corp.	11	126408GH0	6.000%	10/1/2036	$400,000	$400,000	138.187	$552,749	2.880%	$15,919
12	Notes	CSX Corp.	12	126408GK3	6.150%	5/1/2037	$700,000	$700,000	140.143	$980,998	2.950%	$28,939
13	Notes	CSX Corp.	13	126408GP2	7.450%	4/1/2038	$79,226	$79,226	145.982	$115,655	3.740%	$4,326
14	Notes	CSX Corp.	14	126408GS6	6.220%	4/30/2040	$660,000	$660,000	144.718	$955,136	3.070%	$29,323
15	Notes	CSX Corp.	15	126408GU1	5.500%	4/15/2041	$550,000	$550,000	134.948	$742,212	3.120%	$23,157
16	Notes	CSX Corp.	16	126408GW7	4.750%	5/30/2042	$600,000	$600,000	125.735	$754,412	3.070%	$23,160
17	Notes	CSX Corp.	17	126408GX5	4.400%	3/1/2043	$300,000	$300,000	119.997	$359,990	3.120%	$11,232
18	Notes	CSX Corp.	18	126408GY3	4.100%	3/15/2044	$800,000	$800,000	116.135	$929,083	3.110%	$28,894
19	Notes	CSX Corp.	19	126408HF3	3.800%	11/1/2046	$800,000	$800,000	112.624	$900,995	3.080%	$27,751
20	Notes	CSX Corp.	20	126408HK2	4.300%	3/1/2048	$850,000	$850,000	120.772	$1,026,559	3.140%	$32,234
21	Notes	CSX Corp.	21	126408HN6	4.750%	11/15/2048	$650,000	$650,000	128.701	$836,559	3.180%	$26,603
22	Notes	CSX Corp.	22	126408HP1	4.500%	3/15/2049	$400,000	$400,000	124.351	$497,403	3.180%	$15,817
23	Notes	CSX Corp.	23	126408HR7	3.350%	9/15/2049	$600,000	$600,000	105.515	$633,091	3.060%	$19,373
24	Notes	CSX Corp.	24	126408HC0	3.950%	5/1/2050	$600,000	$600,000	116.743	$700,458	3.070%	$21,504
25	Notes	CSX Corp.	25	126408HA4	4.500%	8/1/2054	$450,000	$450,000	125.857	$566,355	3.230%	$18,293
26	Notes	CSX Corp.	26	126408HG1	4.250%	11/1/2066	$700,000	$700,000	122.219	$855,531	3.310%	$28,318
27	Notes	CSX Corp.	27	126408HL0	4.650%	3/1/2068	$350,000	$350,000	129.861	$454,514	3.380%	$15,363
28	Notes	CSXT - Conrail	28	126410LL1	7.875%	5/15/2043	$99,989	$99,989	165.115	$165,096	3.560%	$5,877
29	Sec'd Eq Notes	CSXT	29	126410LM9	6.251%	1/15/2023	$149,452	$149,452	107.759	$161,047	1.010%	$1,627
30	Notes	CSX Corp.	30	126408HT3	2.500%	5/15/2051	$500,000	$500,000	90.740	$453,699	2.970%	$13,475
31	Notes	CSX Corp.	31	126408HS5	3.800%	4/15/2050	$500,000	$500,000	113.747	$568,734	3.080%	$17,517
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49												
50												
Total							**$15,936,245**	**$15,936,245**		**$18,978,132**	**2.664%**	**$505,655**

CSX Corporation
12/31/2021

	Type	Description	No.	CUSIP	Coupon Rate	Maturity Date	Amt. Outstanding ($000) Year-End	Amt. Outstanding ($000) Used	Average Price	Market Value ($ 000)	Average Yield	Interest Cost ($ 000)
					Trading Data Not Available or Did Not Trade							
1	Notes	CSX Corp.			1.310%	12/17/2050	73,304	73,304	100.000	$73,304		
2	Conrail Tax Note	CSXT			1.310%	12/17/2050	368,375	368,375	100.000	$368,375		
3												
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29												
30												
Total							**$441,679**	**$441,679**		**$441,679**		

CSX Corporation
12/31/2021

	Type	Description	No.	CUSIP	Coupon Rate	Maturity Date	Amt. Outstanding ($000) Year-End	Amt. Outstanding ($000) Used	Average Price	Market Value ($ 000)	Average Yield	Interest Cost ($ 000)
						Matures in 2022						
1	Notes	CSX Corp.		126408AQ6	8.100%	9/15/2022	69,081					
2	Notes	CSX Corp.		126408AM5	8.625%	5/15/2022	81,517					
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Total							**$150,598**					

	Grand Totals		
Total Traded and Trading Data Not Available	**$16,377,924**	**$16,377,924**	**$19,419,812**
Grand Total (for reconciliation to carrier data only)	**$16,528,522**		

From CSX:

Corporate Notes	$15,910,706
Convertible Debt	0
CSXT Notes	468,364
Secured Equipment Notes	149,452
Other Notes	0
Total	**$16,528,522**

Norfolk Southern Corporation

12/31/2021

	Type	Description	No.	CUSIP	Coupon Rate	Maturity Date	Amt. Outstanding ($000) Year-End	Amt. Outstanding ($000) Used	Average Price	Market Value ($ 000)	Average Yield	Interest Cost ($ 000)
						Traded						
1	Debenture	Southern Railway	32	655855FB5	7.875%	5/15/2043	$138,085	$138,085	161.155	$222,530	3.750%	$8,345
2	Notes (New)	Senior	33	655844CK2	2.300%	5/15/2031	$500,000	**$312,500**	101.441	$317,004	2.140%	$6,784
3	Notes (New)	Senior	34	655844CJ5	4.100%	5/15/2121	$600,000	**$375,000**	113.135	$424,256	3.620%	$15,358
4	Notes (New)	Senior	35	655844CL0	2.900%	8/25/2051	$600,000	**$250,000**	99.295	$248,237	2.940%	$7,298
5	Notes	Senior	36	655844CF3	3.050%	5/15/2050	$800,000	$800,000	100.183	$801,460	3.040%	$24,364
6	Notes	Senior	37	655844AQ1	7.250%	2/15/2031	$284,028	$284,028	138.779	$394,171	2.640%	$10,406
7	Notes	Senior	38	655844CH9	3.155%	5/15/2055	$799,996	$799,996	100.583	$804,661	3.130%	$25,186
8	Notes	Senior 144A	39	655844CG1	3.155%	5/15/2055	$1	$1	100.776	$1	3.120%	$0
9	Notes	Senior	40	655844BL1	2.903%	2/15/2023	$596,450	$596,450	103.237	$615,755	0.860%	$5,295
10	Notes	Senior 144A	41	655844BK3	2.903%	2/15/2023	$3,550	$3,550	103.266	$3,666	0.840%	$31
11	Notes	Senior	42	655844BD9	6.000%	5/23/2111	$79,726	$79,726	137.972	$110,000	4.330%	$4,763
12	Notes	Senior 2105	43	655844AV0	6.000%	3/15/2105	$157,780	$157,780	136.659	$215,620	4.370%	$9,423
13	Notes	Senior	44	655844AX6	5.640%	5/17/2029	$210,316	$210,316	123.876	$260,531	2.290%	$5,966
14	Notes	Senior	45	655844AW8	5.590%	5/17/2025	$251,172	$251,172	116.377	$292,307	1.220%	$3,566
15	Notes	Senior	46	655844BH0	4.837%	10/1/2041	$595,504	$595,504	127.659	$760,217	3.000%	$22,807
16	Notes	Senior	47	655844BM9	3.950%	10/1/2042	$600,000	$600,000	114.977	$689,862	2.990%	$20,627
17	Notes	Senior	48	655844BN7	4.800%	8/15/2043	$291,829	$291,829	120.549	$351,797	3.460%	$12,172
18	Notes	Senior	49	655844BP2	3.850%	1/15/2024	$400,000	$400,000	107.069	$428,278	0.990%	$4,240
19	Notes	Senior	50	655844BQ0	4.450%	6/15/2045	$500,000	$500,000	122.372	$611,861	3.120%	$19,090
20	Notes	Senior	51	655844BR8	4.650%	1/15/2046	$600,000	$600,000	125.461	$752,767	3.160%	$23,787
21	Notes	Senior	52	655844BS6	2.900%	6/15/2026	$600,000	$600,000	107.491	$644,946	1.330%	$8,578
22	Notes	Senior	53	655844BT4	3.150%	6/1/2027	$300,000	$300,000	108.790	$326,371	1.590%	$5,189
23	Notes	Senior	54	655844BX5	3.942%	11/1/2047	$749,997	$749,997	114.813	$861,094	3.120%	$26,866
24	Notes	Senior	55	655844BV9	4.050%	8/15/2052	$749,994	$749,994	117.545	$881,581	3.160%	$27,858
25	Notes	Senior	56	655844BY3	4.150%	2/28/2048	$700,000	$700,000	117.991	$825,939	3.150%	$26,017
26	Notes	Senior	57	655844CA4	3.650%	8/1/2025	$300,000	$300,000	109.489	$328,466	1.240%	$4,073
27	Notes	Senior	58	655844CC0	4.100%	5/15/2049	$400,000	$400,000	117.797	$471,188	3.140%	$14,795
28	Notes	Senior	59	655844BZ0	3.800%	8/1/2028	$600,000	$600,000	112.749	$676,491	1.860%	$12,583
29	Notes	Senior	60	655844CB2	5.100%	8/1/2118	$350,521	$350,521	125.358	$439,406	4.080%	$17,928
30	Notes	Senior	61	655844CE6	2.550%	11/1/2029	$400,000	$400,000	104.163	$416,651	2.010%	$8,375
31	Notes	Senior	62	655844CD8	3.400%	11/1/2049	$400,000	$400,000	106.157	$424,628	3.080%	$13,079
32	Conrail Notes	CR NSC 2027	63	655844AJ7	7.800%	5/15/2027	$319,135	$319,135	133.763	$426,883	1.690%	$7,214
33	Conrail Notes	CR NSC 2037	64	655844AF5	7.050%	5/1/2037	$171,750	$171,750	142.381	$244,539	3.530%	$8,632
34	Conrail Notes	CR NSC 2097	65	655844AK4	7.900%	5/15/2097	$196,302	$196,302	183.766	$360,737	4.220%	$15,223
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Total							**$14,246,136**	**$13,483,636**		**$15,633,898**	**2.724%**	**$425,918**

Norfolk Southern Corporation

12/31/2021

	Type	Description	No.	CUSIP	Coupon Rate	Maturity Date	Amt. Outstanding ($000) Year-End	Amt. Outstanding ($000) Used	Average Price	Market Value ($ 000)	Average Yield	Interest Cost ($ 000)
					Trading Data Not Available or Did Not Trade							
1												
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Total							$0	$0		$0		

Norfolk Southern Corporation

12/31/2021

	Type	Description	No.	CUSIP	Coupon Rate	Maturity Date	Amt. Outstanding ($000) Year-End	Amt. Outstanding ($000) Used	Average Price	Market Value ($ 000)	Average Yield	Interest Cost ($ 000)
						Matures in 2022						
1	Notes	Senior		655844BJ6	3.000%	4/1/2022	$547,658					
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Total							**$547,658**					

	Grand Totals		
Total Traded and Trading Data Not Available	**$14,246,136**	**$13,483,636**	**$15,633,898**
Grand Total (for reconciliation to carrier data only)	**$14,793,794**		

From NSC:

Income Debentures	$138,085
Medium Term Notes & Conrail Notes	14,655,709
Other Debt (Poca Dev)	0
Total	**$14,793,794**

Union Pacific Corporation
12/31/2021

	Type	Description	No.	CUSIP	Coupon Rate	Maturity Date	Amt. Outstanding ($000) Year-End	Amt. Outstanding ($000) Used	Average Price	Market Value ($ 000)	Average Yield	Interest Cost ($ 000)
						Traded						
1	Debentures	UP Corp.	66	907818CS5	5.375%	6/1/2033	$142,910	$142,910	126.313	$180,514	2.760%	$4,982
2	Debentures	UP Corp.	67	907818CX4	6.150%	5/1/2037	$89,828	$89,828	138.816	$124,696	3.040%	$3,791
3	Debentures	UP Corp.	68	907818CU0	6.250%	5/1/2034	$152,116	$152,116	136.325	$207,373	2.840%	$5,889
4	Debentures	UP Corp.	69	907818CF3	6.625%	2/1/2029	$389,108	$389,108	131.247	$510,691	2.120%	$10,827
5	Debentures	UP Corp.	70	907818BY3	7.125%	2/1/2028	$160,592	$160,592	129.843	$208,518	2.200%	$4,587
6	Notes	UP Corp.	71	907818FJ2	2.150%	2/5/2027	$496,906	$496,906	103.968	$516,625	1.410%	$7,284
7	Notes (New)	UP Corp.	72	907818FU7 *	2.375%	5/20/2031	$847,590	**$529,744**	102.530	$543,148	2.090%	$11,352
8	Notes (New)	UP Corp.	73	907818FU7 *	2.375%	5/20/2031	$149,575	**$43,626**	102.418	$44,681	2.100%	$938
9	Notes	UP Corp.	74	907818FH6	2.400%	2/5/2030	$742,705	$742,705	103.018	$765,119	2.020%	$15,455
10	Notes	UP Corp.	75	907818DN5	2.750%	4/15/2023	$324,344	$324,344	103.432	$335,477	0.790%	$2,650
11	Notes	UP Corp.	76	907818EH7	2.750%	3/1/2026	$648,370	$648,370	106.703	$691,832	1.260%	$8,717
12	Notes (Exchange)	UP Corp. 144A	77	907818FP8	2.891%	4/6/2036	$1,716	**$1,287**	103.645	$1,334	2.590%	$35
13	Notes (Exchange)	UP Corp.	78	907818FQ6	2.891%	4/6/2036	$599,550	**$149,888**	104.546	$156,701	2.510%	$3,933
14	Notes	UP Corp.	79	907818DM7	2.950%	1/15/2023	$299,718	$299,718	103.146	$309,148	0.850%	$2,628
15	Notes (New)	UP Corp.	80	907818FW3	2.950%	3/10/2052	$841,064	**$280,355**	101.967	$285,870	2.850%	$8,147
16	Notes (Exchange)	UP Corp.	81	907818FN3	2.973%	9/16/2062	$710,828	**$414,650**	98.910	$410,129	3.020%	$12,386
17	Notes	UP Corp. 144A	82	907818FM5	2.973%	9/16/2062	$3,004	$3,004	95.910	$2,881	3.160%	$91
18	Notes	UP Corp.	83	907818EP9	3.000%	4/15/2027	$493,833	$493,833	108.078	$533,725	1.530%	$8,166
19	Notes	UP Corp.	84	907818FA1	3.150%	3/1/2024	$498,166	$498,166	106.422	$530,156	0.690%	$3,658
20	Notes (New)	UP Corp.	85	907818FT0	3.200%	5/20/2041	$991,051	**$619,407**	106.225	$657,965	2.790%	$18,357
21	Notes	UP Corp.	86	907818DY1	3.250%	1/15/2025	$348,762	$348,762	107.392	$374,541	1.100%	$4,120
22	Notes	UP Corp.	87	907818ED6	3.250%	8/15/2025	$499,379	$499,379	108.243	$540,542	1.180%	$6,378
23	Notes	UP Corp.	88	907818FK9	3.250%	2/5/2050	$1,693,474	$1,693,474	104.897	$1,776,410	3.000%	$53,292
24	Notes	UP Corp.	89	907818EK0	3.350%	8/15/2046	$296,295	$296,295	106.050	$314,221	3.010%	$9,458
25	Notes	UP Corp.	90	907818EB0	3.375%	2/1/2035	$445,758	$445,758	109.714	$489,057	2.530%	$12,373
26	Notes	UP Corp.	91	907818EU8	3.500%	6/8/2023	$648,325	$648,325	105.515	$684,080	0.580%	$3,968
27	Notes	UP Corp.	92	907818FD5	3.550%	8/15/2039	$494,094	$494,094	110.625	$546,590	2.800%	$15,305
28	Notes (New)	UP Corp.	93	907818FV5	3.550%	5/20/2061	$640,188	**$400,118**	109.553	$438,340	3.130%	$13,720
29	Notes	UP Corp.	94	907818EQ7	3.600%	9/15/2037	$495,374	$495,374	111.323	$551,465	2.730%	$15,055
30	Notes	UP Corp.	95	907818DR6	3.646%	2/15/2024	$414,278	$414,278	107.028	$443,394	0.900%	$3,991
31	Notes	UP Corp.	96	907818FB9	3.700%	3/1/2029	$769,694	$769,694	112.184	$863,470	1.970%	$17,010
32	Notes	UP Corp.	97	907818DV7	3.750%	3/15/2024	$398,452	$398,452	107.408	$427,970	0.940%	$4,023
33	Notes	UP Corp.	98	907818ES3	3.750%	7/15/2025	$497,980	$497,980	110.356	$549,549	1.100%	$6,045
34	Notes	UP Corp.	99	907818FL7	3.750%	2/5/2070	$742,196	$742,196	110.952	$823,484	3.310%	$27,257
35	Notes	UP Corp.	100	907818EM6	3.799%	10/1/2051	$707,227	$707,227	114.370	$808,853	3.070%	$24,832
36	Notes (Exchange)	UP Corp.	101	907818FS2	3.799%	4/6/2071	$815,766	**$203,942**	117.573	$239,780	3.100%	$7,433
37	Notes (Exchange)	UP Corp. 144A	102	907818FR4	3.799%	4/6/2071	$7,274	**$5,456**	112.775	$6,152	3.280%	$202
38	Notes	UP Corp.	103	907818FG8	3.839%	3/20/2060	$1,412,079	$1,412,079	114.071	$1,610,779	3.210%	$51,706
39	Notes	UP Corp. 144A	104	907818FF0	3.839%	3/20/2060	$184	$184	113.927	$210	3.220%	$7
40	Notes	UP Corp.	105	907818EC8	3.875%	2/1/2055	$444,156	$444,156	113.821	$505,542	3.200%	$16,177
41	Notes	UP Corp.	106	907818EY0	3.950%	9/10/2028	$1,047,347	$1,047,347	113.954	$1,193,494	1.860%	$22,199
42	Notes	UP Corp.	107	907818FE3	3.950%	8/15/2059	$491,213	$491,213	116.165	$570,618	3.220%	$18,374
43	Notes	UP Corp.	108	907818EN4	4.000%	4/15/2047	$489,321	$489,321	116.249	$568,833	3.090%	$17,577
44	Notes	UP Corp.	109	907818EF1	4.050%	11/15/2045	$395,762	$395,762	116.226	$459,980	3.100%	$14,259
45	Notes	UP Corp.	110	907818EJ3	4.050%	3/1/2046	$515,421	$515,421	116.553	$600,736	3.090%	$18,563
46	Notes	UP Corp.	111	907818ER5	4.100%	9/15/2067	$494,430	$494,430	117.628	$581,590	3.360%	$19,541
47	Notes	UP Corp.	112	907818DZ8	4.150%	1/15/2045	$228,875	$228,875	115.923	$265,318	3.190%	$8,464
48	Notes	UP Corp.	113	907818DP0	4.250%	4/15/2043	$183,460	$183,460	115.507	$211,909	3.250%	$6,887
49	Notes	UP Corp.	114	907818DL9	4.300%	6/15/2042	$204,297	$204,297	115.662	$236,295	3.270%	$7,727
50	Notes	UP Corp.	115	907818FC7	4.300%	3/1/2049	$626,716	$626,716	122.384	$767,001	3.090%	$23,700
51	Notes	UP Corp.	116	907818EV6	4.375%	9/10/2038	$230,968	$230,968	119.247	$275,422	2.940%	$8,097
52	Notes	UP Corp.	117	907818EG9	4.375%	11/15/2065	$169,327	$169,327	120.355	$203,794	3.480%	$7,092
53	Notes	UP Corp.	118	907818EW4	4.500%	9/10/2048	$385,927	$385,927	125.013	$482,460	3.130%	$15,101
54	Notes	UP Corp.	119	907818DJ4	4.750%	9/15/2041	$212,391	$212,391	122.890	$261,007	3.200%	$8,352
55	Notes	UP Corp.	120	907818DU9	4.750%	12/15/2043	$182,720	$182,720	120.882	$220,875	3.410%	$7,532

Union Pacific Corporation
12/31/2021

	Type	Description	No.	CUSIP	Coupon Rate	Maturity Date	Amt. Outstanding ($000) Year-End	Amt. Outstanding ($000) Used	Average Price	Market Value ($ 000)	Average Yield	Interest Cost ($ 000)
56	Notes	UP Corp.	121	907818EX2	4.800%	9/10/2058	$25,782	$25,782	121.044	$31,207	3.750%	$1,170
57	Notes	UP Corp.	122	907818DT2]	4.821%	2/1/2044	$128,660	$128,660	123.382	$158,744	3.340%	$5,302
58	Notes	UP Corp. 144A	123	907818DS4]	4.821%	2/1/2044	$1	$1	123.683	$1	3.320%	$0
59	Notes	UP Corp.	124	907818DX3	4.850%	6/15/2044	$83,294	$83,294	123.372	$102,761	3.380%	$3,473
60	Notes	UP Corp.	125	907818DF2]	5.780%	7/15/2040	$63,878	$63,878	131.711	$84,134	3.490%	$2,936
61	Notes	UP Corp. 144A	126	907818DE5]	5.780%	7/15/2040	$10	$10	129.917	$13	3.600%	$0
62												
Total							**$26,513,709**	**$23,557,577**		**$26,287,202**	**2.444%**	**$642,575**

Trading Data Not Available or Did Not Trade

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Total							**$0**	**$0**		**$0**		

* CUSIP 907818FU7 was offered during 2021 in two portions at differing times, and is therefore split (this time) herein for weighting purposes.

Union Pacific Corporation

12/31/2021

	Type	Description	No.	CUSIP	Coupon Rate	Maturity Date	Amt. Outstanding ($000) Year-End	Amt. Outstanding ($000) Used	Average Price	Market Value ($ 000)	Average Yield	Interest Cost ($ 000)
						Matures in 2022						
1	Notes	UP Corp.		907818EZ7	2.950%	3/1/2022	499,850					
2	Notes	UP Corp.		907818DK1	4.163%	7/15/2022	737,813					
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9												
10												
Total							**$1,237,663**					

		Grand Totals		
Total Traded and Trading Data Not Available		**$26,513,709**	**$23,557,577**	**$26,287,202**
Grand Total (for reconciliation to carrier data only)		**$27,751,372**		

From UNP:

Corporate Debentures, Notes, Floating Rate Loans, and Commercial Paper	$28,251,344
Removal of Floating Rate Loans & Commercial Paper	-499,972
UP RR Debt Securities Outstanding	299,776
Removal of unamortized SOR Fees	-300,000
Removal of Sale of Receivables	224
Total	**$27,751,372**

CSX Corporation

1

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HB2
Coupon Rate:	3.400%
Maturity Date:	8/1/2024
Amount Outstanding ($ 000)	$550,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	109.395	0.68 %
February	108.897	0.76
March	108.216	0.89
April	108.330	0.79
May	108.213	0.77
June	107.728	0.85
July	107.793	0.76
August	107.557	0.77
September	107.249	0.80
October	106.269	1.08
November	105.714	1.21
December	105.405	1.26
Average	107.564	0.89 %

Source: Bloomberg

CSX Corporation

2

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HD8
Coupon Rate:	3.350%
Maturity Date:	11/1/2025
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	111.479	0.88 %
February	110.078	1.13
March	109.063	1.30
April	109.576	1.16
May	109.708	1.09
June	109.406	1.12
July	109.767	0.99
August	109.018	1.13
September	108.287	1.26
October	107.519	1.41
November	107.120	1.47
December	106.777	1.52
Average	108.983	1.21 %

Source: Bloomberg

CSX Corporation

3

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HE6
Coupon Rate:	2.600%
Maturity Date:	11/1/2026
Amount Outstanding ($ 000)	$700,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	109.090	0.97 %
February	107.373	1.25
March	105.554	1.56
April	106.316	1.40
May	106.832	1.29
June	106.543	1.33
July	107.052	1.21
August	106.625	1.27
September	106.095	1.35
October	105.276	1.50
November	105.040	1.53
December	104.279	1.67
Average	106.340	1.36 %

Source: Bloomberg

CSX Corporation

4

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408BP7
Coupon Rate:	7.250%
Maturity Date:	5/1/2027
Amount Outstanding ($ 000)	$83,312
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	122.376	3.26 %
February	120.924	3.45
March	119.082	3.71
April	119.695	3.57
May	120.151	3.45
June	120.827	3.29
July	122.154	3.02
August	127.824	2.03
September	126.817	2.12
October	127.792	1.90
November	127.165	1.94
December	126.401	2.00
Average	123.434	2.81 %

Source: Bloomberg

CSX Corporation

5

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408BM4
Coupon Rate:	7.950%
Maturity Date:	5/1/2027
Amount Outstanding ($ 000)	$64,266
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	136.189	1.80 %
February	133.912	2.06
March	131.671	2.33
April	132.179	2.19
May	132.620	2.06
June	132.694	1.98
July	133.749	1.75
August	132.712	1.84
September	131.587	1.94
October	130.470	2.06
November	129.842	2.09
December	128.751	2.20
Average	132.198	2.03 %

Source: Bloomberg

CSX Corporation

6

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HH9
Coupon Rate:	3.250%
Maturity Date:	6/1/2027
Amount Outstanding ($ 000)	$850,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	112.572	1.18 %
February	110.622	1.46
March	108.451	1.79
April	109.146	1.66
May	109.579	1.57
June	109.587	1.55
July	110.095	1.44
August	109.574	1.51
September	108.931	1.59
October	107.650	1.80
November	106.890	1.92
December	107.165	1.85
Average	109.189	1.61 %

Source: Bloomberg

CSX Corporation

7

Type:	Notes
Description:	CSX Corp.
CUSIP:	12641LBU6
Coupon Rate:	6.800%
Maturity Date:	12/1/2028
Amount Outstanding ($ 000)	$200,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	129.077	2.66 %
February	126.705	2.92
March	124.256	3.20
April	125.176	3.05
May	124.869	3.06
June	128.137	2.60
July	129.571	2.38
August	130.893	2.17
September	130.025	2.24
October	128.838	2.35
November	129.175	2.27
December	128.821	2.27
Average	127.962	2.60 %

Source: Bloomberg

CSX Corporation

8

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HJ5
Coupon Rate:	3.800%
Maturity Date:	3/1/2028
Amount Outstanding ($ 000)	$800,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	115.341	1.51 %
February	112.647	1.86
March	110.904	2.10
April	111.477	1.99
May	112.081	1.88
June	112.829	1.75
July	113.798	1.58
August	112.917	1.69
September	111.900	1.82
October	111.137	1.92
November	110.421	2.02
December	110.293	2.01
Average	112.145	1.84 %

Source: Bloomberg

CSX Corporation

9

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HM8
Coupon Rate:	4.250%
Maturity Date:	3/15/2029
Amount Outstanding ($ 000)	$950,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	119.474	1.68 %
February	116.710	1.99
March	113.643	2.36
April	114.647	2.21
May	115.119	2.13
June	116.311	1.96
July	117.350	1.80
August	116.354	1.91
September	115.368	2.02
October	114.537	2.11
November	113.808	2.19
December	113.383	2.23
Average	115.559	2.05 %

Source: Bloomberg

$350,000
600,000
$950,000

same CUSIP

CSX Corporation

10

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HQ9
Coupon Rate:	2.400%
Maturity Date:	2/15/2030
Amount Outstanding ($ 000)	$400,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	106.534	1.62 %
February	103.755	1.94
March	100.682	2.31
April	101.440	2.22
May	101.865	2.16
June	102.883	2.03
July	104.293	1.85
August	103.395	1.96
September	102.849	2.03
October	102.210	2.11
November	101.845	2.15
December	101.815	2.16
Average	102.797	2.05 %

Source: Bloomberg

CSX Corporation

11

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408GH0
Coupon Rate:	6.000%
Maturity Date:	10/1/2036
Amount Outstanding ($ 000)	$400,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	144.192	2.56 %
February	139.473	2.85
March	133.931	3.20
April	135.848	3.06
May	136.378	3.02
June	138.700	2.85
July	141.420	2.66
August	139.814	2.76
September	137.537	2.90
October	136.409	2.96
November	137.659	2.87
December	136.887	2.91
Average	138.187	2.88 %

Source: Bloomberg

CSX Corporation

12

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408GK3
Coupon Rate:	6.150%
Maturity Date:	5/1/2037
Amount Outstanding ($ 000)	$700,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	144.531	2.74 %
February	139.452	3.04
March	135.860	3.27
April	137.789	3.13
May	137.635	3.13
June	140.781	2.92
July	143.697	2.72
August	141.989	2.82
September	139.883	2.94
October	140.269	2.90
November	140.319	2.89
December	139.506	2.93
Average	140.143	2.95 %

Source: Bloomberg

CSX Corporation

13

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408GP2
Coupon Rate:	7.450%
Maturity Date:	4/1/2038
Amount Outstanding ($ 000)	$79,226
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	138.468	4.27 %
February	133.630	4.59
March	128.791	4.93
April	146.009	3.75
May	147.403	3.65
June	151.929	3.37
July	154.572	3.20
August	151.404	3.38
September	149.678	3.47
October	150.240	3.42
November	150.902	3.37
December	148.753	3.49
Average	145.982	3.74 %

Source: Bloomberg

CSX Corporation

14

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408GS6
Coupon Rate:	6.220%
Maturity Date:	4/30/2040
Amount Outstanding ($ 000)	$660,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	148.703	2.90 %
February	144.004	3.15
March	137.576	3.50
April	141.074	3.29
May	142.282	3.22
June	146.373	2.98
July	148.644	2.85
August	147.005	2.93
September	145.740	2.99
October	146.209	2.96
November	145.329	3.00
December	143.672	3.08
Average	144.718	3.07 %

Source: Bloomberg

CSX Corporation

15

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408GU1
Coupon Rate:	5.500%
Maturity Date:	4/15/2041
Amount Outstanding ($ 000)	$550,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	139.118	2.92 %
February	133.439	3.23
March	129.682	3.44
April	132.170	3.29
May	132.505	3.26
June	135.859	3.07
July	138.954	2.89
August	137.166	2.98
September	135.308	3.08
October	135.405	3.07
November	135.869	3.04
December	133.896	3.14
Average	134.948	3.12 %

Source: Bloomberg

$300,000
250,000
$550,000

same CUSIP

CSX Corporation

16

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408GW7
Coupon Rate:	4.750%
Maturity Date:	5/30/2042
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	129.124	2.91 %
February	124.629	3.15
March	120.688	3.37
April	122.205	3.28
May	123.068	3.23
June	126.557	3.03
July	129.461	2.86
August	127.684	2.96
September	126.377	3.02
October	126.909	2.99
November	126.599	3.00
December	125.522	3.06
Average	125.735	3.07 %

Source: Bloomberg

CSX Corporation

17

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408GX5
Coupon Rate:	4.400%
Maturity Date:	3/1/2043
Amount Outstanding ($ 000)	$300,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	123.912	2.92 %
February	117.939	3.25
March	114.669	3.44
April	116.259	3.34
May	117.537	3.27
June	120.720	3.08
July	123.676	2.91
August	122.605	2.97
September	120.840	3.07
October	120.752	3.07
November	121.100	3.04
December	119.952	3.11
Average	119.997	3.12 %

Source: Bloomberg

CSX Corporation

18

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408GY3
Coupon Rate:	4.100%
Maturity Date:	3/15/2044
Amount Outstanding ($ 000)	$800,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	120.131	2.90 %
February	113.722	3.25
March	110.582	3.43
April	112.486	3.32
May	113.213	3.27
June	116.785	3.07
July	119.827	2.90
August	118.439	2.97
September	116.881	3.06
October	116.675	3.06
November	118.138	2.98
December	116.746	3.06
Average	116.135	3.11 %

Source: Bloomberg

CSX Corporation

19

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HF3
Coupon Rate:	3.800%
Maturity Date:	11/1/2046
Amount Outstanding ($ 000)	$800,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	116.333	2.90 %
February	110.378	3.20
March	106.062	3.44
April	108.233	3.32
May	109.130	3.27
June	113.220	3.05
July	116.024	2.90
August	114.932	2.96
September	113.171	3.05
October	115.079	2.94
November	115.602	2.92
December	113.329	3.03
Average	112.624	3.08 %

Source: Bloomberg

CSX Corporation

20

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HK2
Coupon Rate:	4.300%
Maturity Date:	3/1/2048
Amount Outstanding ($ 000)	$850,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	125.645	2.92 %
February	118.409	3.27
March	114.074	3.49
April	115.533	3.41
May	116.708	3.35
June	121.064	3.13
July	124.087	2.98
August	123.236	3.02
September	121.846	3.08
October	123.291	3.01
November	123.009	3.02
December	122.358	3.05
Average	120.772	3.14 %

Source: Bloomberg

CSX Corporation

21

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HN6
Coupon Rate:	4.750%
Maturity Date:	11/15/2048
Amount Outstanding ($ 000)	$650,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	133.552	2.97 %
February	125.458	3.34
March	120.283	3.59
April	123.132	3.44
May	124.192	3.39
June	129.584	3.13
July	132.575	2.99
August	131.391	3.04
September	130.217	3.10
October	132.104	3.01
November	132.282	3.00
December	129.646	3.11
Average	128.701	3.18 %

Source: Bloomberg

CSX Corporation

22

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HP1
Coupon Rate:	4.500%
Maturity Date:	3/15/2049
Amount Outstanding ($ 000)	$400,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	128.591	2.99 %
February	121.755	3.30
March	116.372	3.57
April	118.941	3.44
May	119.957	3.39
June	124.867	3.15
July	128.114	3.00
August	126.831	3.05
September	125.593	3.11
October	127.664	3.01
November	127.954	2.99
December	125.570	3.10
Average	124.351	3.18 %

Source: Bloomberg

CSX Corporation

23

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HR7
Coupon Rate:	3.350%
Maturity Date:	9/15/2049
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	109.343	2.87 %
February	102.576	3.21
March	98.397	3.44
April	100.781	3.31
May	101.241	3.28
June	105.792	3.04
July	109.137	2.87
August	108.155	2.92
September	106.589	3.00
October	108.480	2.90
November	108.701	2.89
December	106.989	2.98
Average	105.515	3.06 %

Source: Bloomberg

CSX Corporation

24

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HC0
Coupon Rate:	3.950%
Maturity Date:	5/1/2050
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	121.196	2.87 %
February	114.286	3.19
March	108.861	3.46
April	111.332	3.34
May	112.673	3.27
June	117.626	3.03
July	119.999	2.92
August	119.347	2.95
September	117.632	3.02
October	119.684	2.93
November	119.601	2.93
December	118.678	2.97
Average	116.743	3.07 %

Source: Bloomberg

CSX Corporation

25

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HA4
Coupon Rate:	4.500%
Maturity Date:	8/1/2054
Amount Outstanding ($ 000)	$450,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	129.572	3.08 %
February	123.722	3.32
March	116.930	3.62
April	120.976	3.44
May	121.685	3.40
June	126.649	3.19
July	130.335	3.04
August	128.629	3.11
September	126.855	3.18
October	129.213	3.08
November	128.783	3.09
December	126.931	3.17
Average	125.857	3.23 %

Source: Bloomberg

CSX Corporation

26

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HG1
Coupon Rate:	4.250%
Maturity Date:	11/1/2066
Amount Outstanding ($ 000)	$700,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	127.259	3.13 %
February	118.974	3.43
March	114.218	3.61
April	117.513	3.48
May	117.871	3.47
June	123.336	3.26
July	127.141	3.13
August	124.960	3.20
September	122.517	3.29
October	125.039	3.20
November	124.456	3.22
December	123.341	3.26
Average	122.219	3.31 %

Source: Bloomberg

CSX Corporation

27

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HL0
Coupon Rate:	4.650%
Maturity Date:	3/1/2068
Amount Outstanding ($ 000)	$350,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	135.037	3.20 %
February	126.924	3.48
March	121.276	3.69
April	124.065	3.59
May	124.885	3.55
June	131.136	3.33
July	134.855	3.20
August	133.057	3.26
September	130.325	3.36
October	132.956	3.27
November	133.286	3.25
December	130.531	3.35
Average	129.861	3.38 %

Source: Bloomberg

CSX Corporation

28

Type:	Notes
Description:	CSXT - Conrail
CUSIP:	126410LL1
Coupon Rate:	7.875%
Maturity Date:	5/15/2043
Amount Outstanding ($ 000)	$99,989
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	166.254	3.55 %
February	161.625	3.76
March	157.134	3.97
April	160.109	3.82
May	160.833	3.77
June	165.302	3.55
July	168.162	3.41
August	166.490	3.48
September	163.788	3.60
October	168.590	3.37
November	172.845	3.17
December	170.242	3.28
Average	165.115	3.56 %

Source: Bloomberg

CSX Corporation

29

Type:	Sec'd Eq Notes
Description:	CSXT
CUSIP:	126410LM9
Coupon Rate:	6.251%
Maturity Date:	1/15/2023
Amount Outstanding ($ 000)	$149,452
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	110.327	0.90 %
February	109.728	0.99
March	109.135	1.05
April	108.889	0.96
May	108.530	0.93
June	107.796	1.12
July	107.807	0.82
August	107.282	0.89
September	106.703	0.97
October	106.113	1.12
November	105.949	0.90
December	104.844	1.50
Average	107.759	1.01 %

Source: Bloomberg

CSX Corporation

30

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HT3
Coupon Rate:	2.500%
Maturity Date:	5/15/2051
Amount Outstanding ($ 000)	$500,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	94.216	2.78 %
February	88.214	3.10
March	84.589	3.31
April	86.370	3.21
May	87.001	3.18
June	90.907	2.96
July	93.620	2.82
August	92.440	2.88
September	91.329	2.94
October	93.630	2.82
November	93.197	2.84
December	93.364	2.83
Average	90.740	2.97 %

Source: Bloomberg

CSX Corporation

31

Type:	Notes
Description:	CSX Corp.
CUSIP:	126408HS5
Coupon Rate:	3.800%
Maturity Date:	4/15/2050
Amount Outstanding ($ 000)	$500,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	118.242	2.87 %
February	110.810	3.23
March	106.157	3.46
April	108.431	3.34
May	110.179	3.25
June	114.382	3.05
July	117.512	2.90
August	116.050	2.96
September	114.501	3.04
October	116.814	2.93
November	116.873	2.92
December	115.010	3.01
Average	113.747	3.08 %

Source: Bloomberg

Norfolk Southern Corp.

32

Type:	Debenture
Description:	Southern Railway
CUSIP:	655855FB5
Coupon Rate:	7.875%
Maturity Date:	5/15/2043
Amount Outstanding ($ 000)	$138,085
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	166.737	3.53 %
February	161.929	3.74
March	155.842	4.03
April	157.813	3.93
May	156.537	3.99
June	160.617	3.78
July	163.328	3.64
August	163.070	3.64
September	162.507	3.66
October	161.477	3.71
November	161.793	3.68
December	162.204	3.66
Average	161.155	3.75 %

Source: Bloomberg

Norfolk Southern Corp.

33

Type:	Notes (New)
Description:	Senior
CUSIP:	655844CK2
Coupon Rate:	2.300%
Maturity Date:	5/15/2031
Amount Outstanding ($ 000)	$500,000
Months Outstanding	7.5

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	100.270	2.27
June	101.332	2.15
July	103.232	1.94
August	102.462	2.02
September	101.340	2.15
October	101.036	2.18
November	100.935	2.19
December	100.924	2.19
Average	101.441	2.14 %

Source: Bloomberg

Prospectus supplement dated May 3, 2021
Interest accrues from May 12, 2021

Norfolk Southern Corp.

34

Type:	Notes (New)
Description:	Senior
CUSIP:	655844CJ5
Coupon Rate:	4.100%
Maturity Date:	5/15/2121
Amount Outstanding ($ 000)	$600,000
Months Outstanding	7.5

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	103.626	3.95
June	109.018	3.75
July	114.884	3.56
August	115.168	3.55
September	113.434	3.60
October	116.924	3.49
November	117.605	3.47
December	114.420	3.57
Average	113.135	3.62 %

Source: Bloomberg

Prospectus supplement dated May 3, 2021
Interest accrues from May 12, 2021

Norfolk Southern Corp.

35

Type:	Notes (New)
Description:	Senior
CUSIP:	655844CL0
Coupon Rate:	2.900%
Maturity Date:	8/25/2051
Amount Outstanding ($ 000)	$600,000
Months Outstanding	5.0

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	Not Traded	-
June	Not Traded	-
July	Not Traded	-
August	99.405	2.93
September	97.551	3.03
October	100.209	2.89
November	100.212	2.89
December	99.096	2.95
Average	99.295	2.94 %

Source: Bloomberg

Prospectus supplement dated August 16, 2021
Interest accrues from August 25, 2021

Norfolk Southern Corp.

36

Type:	Notes
Description:	Senior
CUSIP:	655844CF3
Coupon Rate:	3.050%
Maturity Date:	5/15/2050
Amount Outstanding ($ 000)	$800,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	104.872	2.81 %
February	98.014	3.15
March	94.600	3.34
April	95.969	3.27
May	96.029	3.26
June	99.885	3.06
July	102.998	2.90
August	102.083	2.94
September	100.386	3.03
October	102.809	2.91
November	102.854	2.90
December	101.691	2.96
Average	100.183	3.04 %

Source: Bloomberg

Norfolk Southern Corp.

37

Type:	Notes
Description:	Senior
CUSIP:	655844AQ1
Coupon Rate:	7.250%
Maturity Date:	2/15/2031
Amount Outstanding ($ 000)	$284,028
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	144.416	2.28 %
February	140.168	2.64
March	136.190	2.99
April	137.071	2.87
May	137.278	2.83
June	139.897	2.55
July	141.018	2.41
August	139.982	2.48
September	138.156	2.63
October	137.727	2.64
November	137.160	2.67
December	136.285	2.73
Average	138.779	2.64 %

Source: Bloomberg

Norfolk Southern Corp.

38

Type:	Notes
Description:	Senior
CUSIP:	655844CH9
Coupon Rate:	3.155%
Maturity Date:	5/15/2055
Amount Outstanding ($ 000)	$799,996
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	104.337	2.95 %
February	97.555	3.27
March	93.666	3.47
April	95.569	3.38
May	96.557	3.33
June	100.929	3.11
July	104.212	2.96
August	102.773	3.02
September	101.222	3.10
October	103.593	2.99
November	104.015	2.97
December	102.569	3.03
Average	100.583	3.13 %

Source: Bloomberg

Note: This is the exchange-traded portion of these notes. The Rule 144-A notes similar to these have a different CUSIP, and are shown on the next page.

38	Exchange traded	**$799,996**
39	Rule 144-A	1
		$799,997

Norfolk Southern Corp.

39

Type:	Notes
Description:	Senior 144A
CUSIP:	655844CG1
Coupon Rate:	3.155%
Maturity Date:	5/15/2055
Amount Outstanding ($ 000)	$1
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	104.793	2.93 %
February	98.926	3.21
March	93.450	3.49
April	95.367	3.39
May	96.287	3.34
June	100.619	3.13
July	103.643	2.98
August	103.019	3.01
September	101.475	3.08
October	103.406	2.99
November	105.624	2.89
December	102.701	3.03
Average	100.776	3.12 %

Source: Bloomberg

Note: These are Rule 144-A notes, which trade among qualified institutional buyers and have their own CUSIP. The exchange-traded notes similar to these are on the proceeding page.

38	Exchange traded	$799,996
39	Rule 144-A	1
		$799,997

Norfolk Southern Corp.

40

Type:	Notes
Description:	Senior
CUSIP:	655844BL1
Coupon Rate:	2.903%
Maturity Date:	2/15/2023
Amount Outstanding ($ 000)	$596,450
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	104.495	0.68 %
February	104.244	0.71
March	103.939	0.77
April	103.811	0.74
May	103.666	0.73
June	103.365	0.81
July	103.189	0.81
August	103.036	0.80
September	102.751	0.87
October	102.380	1.03
November	102.073	1.16
December	101.891	1.19
Average	103.237	0.86 %

Source: Bloomberg

Note: This is the exchange-traded portion of these notes. The Rule 144-A notes similar to these have a different CUSIP, and are shown on the next page.

40	Exchange traded	**$596,450**
41	Rule 144-A	3,550
		$600,000

Norfolk Southern Corp.

41

Type:	Notes
Description:	Senior 144A
CUSIP:	655844BK3
Coupon Rate:	2.903%
Maturity Date:	2/15/2023
Amount Outstanding ($ 000)	$3,550
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	104.538	0.66 %
February	104.288	0.69
March	104.028	0.72
April	103.838	0.73
May	103.705	0.71
June	103.374	0.80
July	103.202	0.80
August	103.034	0.80
September	102.819	0.82
October	102.421	1.00
November	102.074	1.16
December	101.876	1.20
Average	103.266	0.84 %

Source: Bloomberg

Note: These are Rule 144-A notes, which trade among qualified institutional buyers and have their own CUSIP. The exchange-traded notes similar to these are on the proceeding page.

40	Exchange traded	$596,450
41	Rule 144-A	**3,550**
		$600,000

Norfolk Southern Corp.

42

Type:	Notes
Description:	Senior
CUSIP:	655844BD9
Coupon Rate:	6.000%
Maturity Date:	5/23/2111
Amount Outstanding ($ 000)	$79,726
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	135.779	4.40 %
February	134.813	4.43
March	128.298	4.66
April	131.691	4.54
May	132.030	4.52
June	137.757	4.33
July	143.288	4.16
August	142.919	4.17
September	139.406	4.28
October	141.384	4.21
November	144.949	4.11
December	143.355	4.15
Average	137.972	4.33 %

Source: Bloomberg

Norfolk Southern Corp.

43

Type:	Notes
Description:	Senior 2105
CUSIP:	655844AV0
Coupon Rate:	6.000%
Maturity Date:	3/15/2105
Amount Outstanding ($ 000)	$157,780
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	136.579	4.36 %
February	132.129	4.52
March	125.845	4.75
April	129.273	4.62
May	131.011	4.55
June	134.861	4.42
July	139.373	4.27
August	140.939	4.22
September	137.719	4.32
October	142.004	4.19
November	146.572	4.05
December	143.598	4.14
Average	136.659	4.37 %

Source: Bloomberg

Norfolk Southern Corp.

44

Type:	Notes
Description:	Senior
CUSIP:	655844AX6
Coupon Rate:	5.640%
Maturity Date:	5/17/2029
Amount Outstanding ($ 000)	$210,316
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	127.079	2.07 %
February	124.526	2.34
March	122.290	2.58
April	123.321	2.43
May	123.377	2.40
June	124.374	2.25
July	125.435	2.09
August	124.556	2.16
September	123.245	2.30
October	123.031	2.30
November	123.022	2.27
December	122.255	2.34
Average	123.876	2.29 %

Source: Bloomberg

Norfolk Southern Corp.

45

Type:	Notes
Description:	Senior
CUSIP:	655844AW8
Coupon Rate:	5.590%
Maturity Date:	5/17/2025
Amount Outstanding ($ 000)	$251,172
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	119.553	0.93 %
February	118.239	1.14
March	117.100	1.31
April	117.437	1.16
May	117.450	1.08
June	116.984	1.10
July	117.211	0.95
August	116.458	1.05
September	115.431	1.22
October	114.293	1.44
November	113.559	1.55
December	112.811	1.66
Average	116.377	1.22 %

Source: Bloomberg

Norfolk Southern Corp.

46

Type:	Notes
Description:	Senior
CUSIP:	655844BH0
Coupon Rate:	4.837%
Maturity Date:	10/1/2041
Amount Outstanding ($ 000)	$595,504
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	132.221	2.78 %
February	126.846	3.07
March	122.739	3.30
April	124.617	3.19
May	124.923	3.17
June	128.098	2.98
July	130.977	2.81
August	130.042	2.86
September	128.446	2.94
October	128.346	2.95
November	128.137	2.95
December	126.521	3.04
Average	127.659	3.00 %

Source: Bloomberg

$595,502
2
$595,504

This note has 3 CUSIPs, but 2 of them have no trading data available, and 595,504 is the amount submitted by NS

Norfolk Southern Corp.

47

Type:	Notes
Description:	Senior
CUSIP:	655844BM9
Coupon Rate:	3.950%
Maturity Date:	10/1/2042
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	119.096	2.77 %
February	113.685	3.08
March	110.632	3.26
April	112.062	3.17
May	111.780	3.19
June	115.054	2.99
July	117.945	2.82
August	117.225	2.86
September	115.719	2.94
October	115.892	2.93
November	115.934	2.92
December	114.699	2.99
Average	114.977	2.99 %

Source: Bloomberg

Norfolk Southern Corp.

48

Type:	Notes
Description:	Senior
CUSIP:	655844BN7
Coupon Rate:	4.800%
Maturity Date:	8/15/2043
Amount Outstanding ($ 000)	$291,829
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	123.399	3.32 %
February	118.497	3.59
March	113.845	3.87
April	115.977	3.74
May	117.770	3.63
June	121.969	3.38
July	124.882	3.22
August	123.449	3.29
September	121.639	3.39
October	121.719	3.38
November	122.495	3.34
December	120.947	3.42
Average	120.549	3.46 %

Source: Bloomberg

Norfolk Southern Corp.

49

Type:	Notes
Description:	Senior
CUSIP:	655844BP2
Coupon Rate:	3.850%
Maturity Date:	1/15/2024
Amount Outstanding ($ 000)	$400,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	109.022	0.75 %
February	108.522	0.84
March	107.940	0.95
April	107.831	0.90
May	107.892	0.80
June	107.327	0.92
July	107.217	0.87
August	106.776	0.95
September	106.485	0.97
October	105.761	1.19
November	105.228	1.34
December	104.832	1.43
Average	107.069	0.99 %

Source: Bloomberg

Norfolk Southern Corp.

50

Type:	Notes
Description:	Senior
CUSIP:	655844BQ0
Coupon Rate:	4.450%
Maturity Date:	6/15/2045
Amount Outstanding ($ 000)	$500,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	126.533	2.92 %
February	120.716	3.21
March	116.740	3.43
April	117.528	3.38
May	118.449	3.33
June	122.126	3.13
July	125.250	2.97
August	124.398	3.01
September	123.134	3.07
October	125.097	2.97
November	124.973	2.97
December	123.523	3.04
Average	122.372	3.12 %

Source: Bloomberg

Norfolk Southern Corp.

51

Type:	Notes
Description:	Senior
CUSIP:	655844BR8
Coupon Rate:	4.650%
Maturity Date:	1/15/2046
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	130.368	2.93 %
February	124.448	3.22
March	118.969	3.50
April	120.637	3.41
May	121.011	3.39
June	125.208	3.17
July	127.931	3.03
August	127.305	3.05
September	126.319	3.10
October	128.604	2.98
November	128.648	2.98
December	126.085	3.10
Average	125.461	3.16 %

Source: Bloomberg

Norfolk Southern Corp.

52

Type:	Notes
Description:	Senior
CUSIP:	655844BS6
Coupon Rate:	2.900%
Maturity Date:	6/15/2026
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	110.044	0.98 %
February	108.467	1.24
March	107.273	1.44
April	107.894	1.30
May	108.157	1.23
June	108.078	1.21
July	108.348	1.13
August	108.083	1.16
September	107.158	1.32
October	105.854	1.58
November	105.173	1.71
December	105.362	1.65
Average	107.491	1.33 %

Source: Bloomberg

Norfolk Southern Corp.

53

Type:	Notes
Description:	Senior
CUSIP:	655844BT4
Coupon Rate:	3.150%
Maturity Date:	6/1/2027
Amount Outstanding ($ 000)	$300,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	112.154	1.15 %
February	109.833	1.50
March	108.331	1.72
April	109.136	1.57
May	109.270	1.53
June	108.803	1.59
July	109.649	1.42
August	108.990	1.51
September	108.664	1.55
October	107.383	1.76
November	106.848	1.84
December	106.421	1.90
Average	108.790	1.59 %

Source: Bloomberg

Norfolk Southern Corp.

54

Type:	Notes
Description:	Senior
CUSIP:	655844BX5
Coupon Rate:	3.942%
Maturity Date:	11/1/2047
Amount Outstanding ($ 000)	$749,997
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	118.700	2.93 %
February	112.878	3.22
March	108.413	3.46
April	110.690	3.33
May	110.751	3.33
June	114.893	3.11
July	117.747	2.96
August	116.870	3.01
September	115.050	3.10
October	117.557	2.97
November	118.041	2.94
December	116.166	3.03
Average	114.813	3.12 %

Source: Bloomberg

Norfolk Southern Corp.

55

Type:	Notes
Description:	Senior
CUSIP:	655844BV9
Coupon Rate:	4.050%
Maturity Date:	8/15/2052
Amount Outstanding ($ 000)	$749,994
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	121.514	2.99 %
February	114.404	3.31
March	109.718	3.54
April	111.688	3.44
May	113.436	3.35
June	118.360	3.12
July	121.590	2.98
August	119.336	3.08
September	117.935	3.14
October	120.882	3.01
November	121.372	2.98
December	120.306	3.03
Average	117.545	3.16 %

Source: Bloomberg

Norfolk Southern Corp.

56

Type:	Notes
Description:	Senior
CUSIP:	655844BY3
Coupon Rate:	4.150%
Maturity Date:	2/28/2048
Amount Outstanding ($ 000)	$700,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	122.545	2.94 %
February	116.040	3.25
March	112.661	3.43
April	113.935	3.36
May	114.191	3.34
June	117.809	3.16
July	120.061	3.04
August	120.073	3.04
September	118.107	3.14
October	120.683	3.01
November	120.876	3.00
December	118.915	3.09
Average	117.991	3.15 %

Source: Bloomberg

Norfolk Southern Corp.

57

Type:	Notes
Description:	Senior
CUSIP:	655844CA4
Coupon Rate:	3.650%
Maturity Date:	8/1/2025
Amount Outstanding ($ 000)	$300,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	111.910	0.94 %
February	110.441	1.21
March	109.688	1.34
April	109.913	1.24
May	110.257	1.12
June	110.134	1.10
July	110.362	1.00
August	109.702	1.11
September	108.886	1.26
October	107.981	1.45
November	107.464	1.55
December	107.126	1.59
Average	109.489	1.24 %

Source: Bloomberg

Norfolk Southern Corp.

58

Type:	Notes
Description:	Senior
CUSIP:	655844CC0
Coupon Rate:	4.100%
Maturity Date:	5/15/2049
Amount Outstanding ($ 000)	$400,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	121.991	2.95 %
February	115.197	3.27
March	110.864	3.49
April	113.320	3.36
May	113.639	3.35
June	117.475	3.15
July	120.669	3.00
August	120.350	3.01
September	118.343	3.11
October	120.789	2.99
November	121.661	2.94
December	119.266	3.06
Average	117.797	3.14 %

Source: Bloomberg

Norfolk Southern Corp.

59

Type:	Notes
Description:	Senior
CUSIP:	655844BZ0
Coupon Rate:	3.800%
Maturity Date:	8/1/2028
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	116.046	1.53 %
February	113.552	1.84
March	111.371	2.12
April	111.994	2.01
May	112.423	1.93
June	113.339	1.79
July	114.526	1.60
August	113.613	1.70
September	112.496	1.84
October	111.736	1.94
November	111.296	1.98
December	110.590	2.07
Average	112.749	1.86 %

Source: Bloomberg

Norfolk Southern Corp.

60

Type:	Notes
Description:	Senior
CUSIP:	655844CB2
Coupon Rate:	5.100%
Maturity Date:	8/1/2118
Amount Outstanding ($ 000)	$350,521
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	110.595	4.61 %
February	108.350	4.70
March	106.961	4.77
April	120.136	4.23
May	122.356	4.15
June	129.939	3.90
July	134.517	3.77
August	133.285	3.80
September	131.767	3.85
October	134.641	3.76
November	137.829	3.67
December	133.918	3.78
Average	125.358	4.08 %

Source: Bloomberg

Norfolk Southern Corp.

61

Type:	Notes
Description:	Senior
CUSIP:	655844CE6
Coupon Rate:	2.550%
Maturity Date:	11/1/2029
Amount Outstanding ($ 000)	$400,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	107.176	1.67 %
February	104.350	2.00
March	101.857	2.31
April	102.769	2.19
May	103.593	2.08
June	104.950	1.90
July	106.107	1.75
August	105.197	1.86
September	104.196	1.99
October	103.545	2.07
November	103.284	2.10
December	102.928	2.14
Average	104.163	2.01 %

Source: Bloomberg

Norfolk Southern Corp.

62

Type:	Notes
Description:	Senior
CUSIP:	655844CD8
Coupon Rate:	3.400%
Maturity Date:	11/1/2049
Amount Outstanding ($ 000)	$400,000
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	110.174	2.88 %
February	103.890	3.19
March	100.305	3.38
April	101.713	3.31
May	102.802	3.25
June	106.143	3.07
July	108.581	2.95
August	107.927	2.98
September	106.995	3.03
October	109.314	2.91
November	109.225	2.92
December	106.814	3.04
Average	106.157	3.08 %

Source: Bloomberg

Norfolk Southern Corp.

63

Type:	Conrail Notes
Description:	CR NSC 2027
CUSIP:	655844AJ7
Coupon Rate:	7.800%
Maturity Date:	5/15/2027
Amount Outstanding ($ 000)	$319,135
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	137.173	1.57 %
February	136.378	1.61
March	134.278	1.84
April	134.501	1.75
May	134.926	1.62
June	134.494	1.62
July	134.896	1.48
August	134.360	1.49
September	132.939	1.64
October	131.022	1.87
November	130.301	1.92
December	129.882	1.91
Average	133.763	1.69 %

Source: Bloomberg

Norfolk Southern Corp.

64

Type:	Conrail Notes
Description:	CR NSC 2037
CUSIP:	655844AF5
Coupon Rate:	7.050%
Maturity Date:	5/1/2037
Amount Outstanding ($ 000)	$171,750
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	142.546	3.57 %
February	138.193	3.85
March	133.979	4.14
April	141.579	3.61
May	142.250	3.55
June	144.268	3.41
July	145.820	3.30
August	145.290	3.32
September	142.922	3.46
October	144.016	3.38
November	144.501	3.33
December	143.208	3.41
Average	142.381	3.53 %

Source: Bloomberg

Norfolk Southern Corp.

65

Type:	Conrail Notes
Description:	CR NSC 2097
CUSIP:	655844AK4
Coupon Rate:	7.900%
Maturity Date:	5/15/2097
Amount Outstanding ($ 000)	$196,302
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	181.821	4.27 %
February	176.092	4.42
March	169.267	4.61
April	173.679	4.48
May	175.998	4.42
June	182.868	4.24
July	188.741	4.09
August	190.063	4.06
September	185.578	4.17
October	191.125	4.03
November	196.909	3.90
December	193.056	3.99
Average	183.766	4.22 %

Source: Bloomberg

Union Pacific Corp.

66

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818CS5
Coupon Rate:	5.375%
Maturity Date:	6/1/2033
Amount Outstanding ($ 000)	$142,910
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	131.848	2.38 %
February	127.389	2.73
March	123.685	3.03
April	125.974	2.82
May	126.456	2.77
June	126.370	2.76
July	128.652	2.55
August	126.524	2.72
September	125.154	2.83
October	125.169	2.81
November	124.170	2.89
December	124.362	2.86
Average	126.313	2.76 %

Source: Bloomberg

Union Pacific Corp.

67

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818CX4
Coupon Rate:	6.150%
Maturity Date:	5/1/2037
Amount Outstanding ($ 000)	$89,828
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	142.885	2.84 %
February	138.256	3.12
March	133.349	3.43
April	136.135	3.24
May	136.570	3.20
June	139.011	3.03
July	141.761	2.84
August	140.797	2.89
September	138.997	3.00
October	140.006	2.92
November	139.338	2.95
December	138.691	2.99
Average	138.816	3.04 %

Source: Bloomberg

Union Pacific Corp.

68

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818CU0
Coupon Rate:	6.250%
Maturity Date:	5/1/2034
Amount Outstanding ($ 000)	$152,116
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	141.499	2.54 %
February	137.350	2.83
March	133.185	3.14
April	134.632	3.01
May	134.387	3.02
June	136.655	2.82
July	139.038	2.63
August	138.035	2.69
September	136.307	2.80
October	135.748	2.83
November	134.095	2.95
December	134.972	2.86
Average	136.325	2.84 %

Source: Bloomberg

Union Pacific Corp.

69

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818CF3
Coupon Rate:	6.625%
Maturity Date:	2/1/2029
Amount Outstanding ($ 000)	$389,108
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	134.636	1.93 %
February	131.877	2.21
March	129.130	2.50
April	130.932	2.25
May	131.193	2.18
June	131.702	2.08
July	132.810	1.91
August	132.274	1.93
September	130.867	2.06
October	130.294	2.10
November	129.573	2.15
December	129.671	2.09
Average	131.247	2.12 %

Source: Bloomberg

Union Pacific Corp.

70

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818BY3
Coupon Rate:	7.125%
Maturity Date:	2/1/2028
Amount Outstanding ($ 000)	$160,592
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	132.201	2.14 %
February	129.778	2.42
March	129.009	2.48
April	130.164	2.27
May	130.404	2.20
June	130.214	2.17
July	131.338	1.96
August	130.387	2.05
September	129.469	2.12
October	128.931	2.15
November	128.462	2.17
December	127.762	2.22
Average	129.843	2.20 %

Source: Bloomberg

Union Pacific Corp.

71

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FJ2
Coupon Rate:	2.150%
Maturity Date:	2/5/2027
Amount Outstanding ($ 000)	$496,906
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	106.571	1.02 %
February	104.960	1.28
March	102.753	1.65
April	104.019	1.42
May	103.995	1.42
June	103.869	1.43
July	104.792	1.25
August	104.388	1.31
September	103.963	1.38
October	102.855	1.58
November	102.665	1.61
December	102.790	1.58
Average	103.968	1.41 %

Source: Bloomberg

Union Pacific Corp.

72

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818FU7
Coupon Rate:	2.375%
Maturity Date:	5/20/2031
Amount Outstanding ($ 000)	$847,590
Months Outstanding	7.5

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	100.786	2.29
June	102.140	2.13
July	104.122	1.91
August	103.521	1.98
September	102.881	2.04
October	102.414	2.10
November	102.129	2.13
December	102.249	2.11
Average	102.530	2.09 %

Source: Bloomberg

Prospectus supplement dated May 17, 2021
Interest accrues from May 20, 2021

UNP_72	847,590
UNP_73	149,575
	997,165

Union Pacific Corp.

73

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818FU7
Coupon Rate:	2.375%
Maturity Date:	5/20/2031
Amount Outstanding ($ 000)	$149,575
Months Outstanding	3.5

End of Month in 2021	Price	Yield
January		%
February		
March		
April	*	*
May		
June		
July		
August		
September	102.881	2.04
October	102.414	2.10
November	102.129	2.13
December	102.249	2.11
Average	102.418	2.10 %

Source: Bloomberg

Prospectus supplement dated September 7, 2021
Interest accrues from May 20, 2021

* A portion of this set of notes (ID = 72) was offered earlier and traded beginning May. This portion (ID = 73) was offered later, and traded beginning September. Both have the same CUSIP.

UNP_72	847,590
UNP_73	149,575
	997,165

Union Pacific Corp.

74

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FH6
Coupon Rate:	2.400%
Maturity Date:	2/5/2030
Amount Outstanding ($ 000)	$742,705
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	106.413	1.63 %
February	103.226	2.00
March	100.143	2.38
April	101.771	2.18
May	102.079	2.14
June	103.318	1.98
July	104.732	1.80
August	103.910	1.90
September	102.972	2.01
October	102.852	2.02
November	102.398	2.08
December	102.400	2.08
Average	103.018	2.02 %

Source: Bloomberg

Union Pacific Corp.

75

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DN5
Coupon Rate:	2.750%
Maturity Date:	4/15/2023
Amount Outstanding ($ 000)	$324,344
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	104.596	0.65 %
February	104.372	0.67
March	104.103	0.71
April	104.029	0.66
May	103.892	0.65
June	103.605	0.72
July	103.462	0.70
August	103.244	0.73
September	103.020	0.76
October	102.570	0.96
November	102.209	1.12
December	102.087	1.10
Average	103.432	0.79 %

Source: Bloomberg

Union Pacific Corp.

76

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EH7
Coupon Rate:	2.750%
Maturity Date:	3/1/2026
Amount Outstanding ($ 000)	$648,370
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	108.910	0.95 %
February	107.361	1.23
March	106.099	1.46
April	106.940	1.26
May	107.174	1.19
June	106.834	1.24
July	107.648	1.04
August	107.130	1.12
September	106.491	1.23
October	105.741	1.38
November	105.155	1.49
December	104.956	1.52
Average	106.703	1.26 %

Source: Bloomberg

Union Pacific Corp.

77

Type:	Notes (Exchange)
Description:	UP Corp. 144A
CUSIP:	907818FP8
Coupon Rate:	2.891%
Maturity Date:	4/6/2036
Amount Outstanding ($ 000)	$1,716
Months Outstanding	9.0

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	101.109	2.80
May	101.595	2.76
June	103.893	2.57
July	106.644	2.35
August	105.263	2.46
September	103.760	2.58
October	103.132	2.63
November	104.050	2.55
December	103.361	2.61
Average	103.645	2.59 %

Source: Bloomberg

Exchange Offer, 424B3, Prospectus Dated September 3, 2021,
interest accrues from April 6, 2021

Note: These are Rule 144-A notes, which trade among qualified institutional buyers.

77	$1,716
78	599550
	$601,266

Union Pacific Corp.

78

Type:	Notes (Exchange)
Description:	UP Corp.
CUSIP:	907818FQ6
Coupon Rate:	2.891%
Maturity Date:	4/6/2036
Amount Outstanding ($ 000)	$599,550
Months Outstanding	3.0

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	Not Traded	-
June	Not Traded	-
July	Not Traded	-
August	Not Traded	-
September	Not Traded	-
October	103.932	2.56
November	104.660	2.50
December	105.045	2.47
Average	104.546	2.51 %

Source: Bloomberg

Exchange Offer, 424B3, Prospectus Dated September 3, 2021
Note: This is the Exchange traded portion of the notes, the 144A portion is shown on the prior page

78	$599,550
77	1716
	$601,266

Union Pacific Corp.

79

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DM7
Coupon Rate:	2.950%
Maturity Date:	1/15/2023
Amount Outstanding ($ 000)	$299,718
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	104.400	0.68 %
February	104.087	0.74
March	103.877	0.75
April	103.698	0.75
May	103.663	0.67
June	103.289	0.79
July	103.138	0.77
August	102.926	0.80
September	102.666	0.85
October	102.278	1.04
November	101.957	1.18
December	101.776	1.21
Average	103.146	0.85 %

Source: Bloomberg

Union Pacific Corp.

80

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818FW3
Coupon Rate:	2.950%
Maturity Date:	3/10/2052
Amount Outstanding ($ 000)	$841,064
Months Outstanding	4.0

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	Not Traded	-
June	Not Traded	-
July	Not Traded	-
August	Not Traded	-
September	100.059	2.95
October	102.784	2.81
November	103.055	2.80
December	101.971	2.85
Average	101.967	2.85 %

Source: Bloomberg

Prospectus supplement dated September 7, 2021
Interest accrues from September 10, 2021

Union Pacific Corp.

81

Type:	Notes (Exchange)
Description:	UP Corp.
CUSIP:	907818FN3
Coupon Rate:	2.973%
Maturity Date:	9/16/2062
Amount Outstanding ($ 000)	$710,828
Months Outstanding	7.0

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	Not Traded	-
June	95.876	3.15
July	99.465	3.00
August	98.481	3.04
September	97.471	3.08
October	100.539	2.95
November	100.734	2.94
December	99.802	2.98
Average	98.910	3.02 %

Source: Bloomberg

Exchange Offer, 424B3, Prospectus Dated May 5, 2021,

Note: This is the Exchange traded portion of the notes, the 144A portion is shown on the next page

81	$710,828
82	3004
	$713,832

Union Pacific Corp.

82

Type:	Notes
Description:	UP Corp. 144A
CUSIP:	907818FM5
Coupon Rate:	2.973%
Maturity Date:	9/16/2062
Amount Outstanding ($ 000)	$3,004
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	99.963	2.97 %
February	93.416	3.26
March	88.973	3.48
April	90.689	3.39
May	90.598	3.40
June	95.447	3.17
July	98.426	3.04
August	97.936	3.06
September	98.032	3.06
October	99.873	2.98
November	99.868	2.98
December	97.704	3.07
Average	95.910	3.16 %

Source: Bloomberg

Note: These are Rule 144-A notes, which trade among qualified institutional buyers.

82	$3,004
81	710828
	$713,832

Union Pacific Corp.

83

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EP9
Coupon Rate:	3.000%
Maturity Date:	4/15/2027
Amount Outstanding ($ 000)	$493,833
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	110.484	1.24 %
February	108.799	1.49
March	107.498	1.69
April	108.414	1.52
May	108.566	1.47
June	108.364	1.49
July	109.185	1.32
August	108.507	1.42
September	107.918	1.50
October	106.751	1.70
November	106.157	1.79
December	106.294	1.75
Average	108.078	1.53 %

Source: Bloomberg

Union Pacific Corp.

84

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FA1
Coupon Rate:	3.150%
Maturity Date:	3/1/2024
Amount Outstanding ($ 000)	$498,166
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	108.052	0.51 %
February	107.471	0.63
March	106.994	0.71
April	107.061	0.62
May	107.217	0.50
June	106.789	0.58
July	106.658	0.55
August	106.295	0.61
September	105.961	0.65
October	105.299	0.85
November	104.713	1.02
December	104.549	1.01
Average	106.422	0.69 %

Source: Bloomberg

Union Pacific Corp.

85

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818FT0
Coupon Rate:	3.200%
Maturity Date:	5/20/2041
Amount Outstanding ($ 000)	$991,051
Months Outstanding	7.5

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	101.893	3.07
June	105.602	2.83
July	108.230	2.66
August	106.689	2.76
September	105.834	2.81
October	107.421	2.71
November	107.468	2.70
December	106.663	2.75
Average	106.225	2.79 %

Source: Bloomberg

Prospectus supplement dated May 17, 2021
Interest accrues from May 20, 2021

Union Pacific Corp.

86

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DY1
Coupon Rate:	3.250%
Maturity Date:	1/15/2025
Amount Outstanding ($ 000)	$348,762
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	109.164	0.89 %
February	108.076	1.11
March	107.383	1.24
April	108.052	1.03
May	108.069	0.98
June	107.772	1.01
July	108.187	0.84
August	107.586	0.96
September	107.058	1.06
October	106.163	1.28
November	105.690	1.38
December	105.500	1.39
Average	107.392	1.10 %

Source: Bloomberg

Union Pacific Corp.

87

Type:	Notes
Description:	UP Corp.
CUSIP:	907818ED6
Coupon Rate:	3.250%
Maturity Date:	8/15/2025
Amount Outstanding ($ 000)	$499,379
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	110.524	0.88 %
February	108.958	1.18
March	108.069	1.34
April	108.674	1.17
May	108.812	1.10
June	108.450	1.14
July	109.056	0.96
August	108.616	1.02
September	107.909	1.15
October	106.951	1.36
November	106.625	1.41
December	106.271	1.46
Average	108.243	1.18 %

Source: Bloomberg

Union Pacific Corp.

88

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FK9
Coupon Rate:	3.250%
Maturity Date:	2/5/2050
Amount Outstanding ($ 000)	$1,693,474
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	108.513	2.82 %
February	102.511	3.12
March	98.118	3.35
April	99.723	3.27
May	99.855	3.26
June	105.215	2.98
July	107.747	2.85
August	106.596	2.91
September	105.779	2.95
October	108.820	2.80
November	108.381	2.82
December	107.511	2.86
Average	104.897	3.00 %

Source: Bloomberg

Union Pacific Corp.

89

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EK0
Coupon Rate:	3.350%
Maturity Date:	8/15/2046
Amount Outstanding ($ 000)	$296,295
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	108.118	2.90 %
February	102.626	3.20
March	99.701	3.37
April	101.935	3.24
May	101.925	3.24
June	106.029	3.01
July	109.212	2.83
August	108.178	2.89
September	106.800	2.96
October	110.315	2.77
November	110.076	2.78
December	107.686	2.91
Average	106.050	3.01 %

Source: Bloomberg

Union Pacific Corp.

90

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EB0
Coupon Rate:	3.375%
Maturity Date:	2/1/2035
Amount Outstanding ($ 000)	$445,758
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	113.896	2.22 %
February	110.005	2.52
March	105.830	2.86
April	107.703	2.70
May	107.916	2.68
June	109.859	2.51
July	112.221	2.32
August	110.817	2.43
September	109.273	2.55
October	109.225	2.55
November	110.041	2.48
December	109.776	2.49
Average	109.714	2.53 %

Source: Bloomberg

Union Pacific Corp.

91

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EU8
Coupon Rate:	3.500%
Maturity Date:	6/8/2023
Amount Outstanding ($ 000)	$648,325
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	107.106	0.46 %
February	106.769	0.49
March	106.293	0.58
April	106.204	0.52
May	106.088	0.46
June	105.870	0.45
July	105.665	0.42
August	105.308	0.48
September	104.947	0.53
October	104.388	0.74
November	103.897	0.91
December	103.645	0.92
Average	105.515	0.58 %

Source: Bloomberg

Union Pacific Corp.

92

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FD5
Coupon Rate:	3.550%
Maturity Date:	8/15/2039
Amount Outstanding ($ 000)	$494,094
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	112.921	2.66 %
February	109.024	2.91
March	105.674	3.14
April	107.729	3.00
May	108.014	2.98
June	111.303	2.75
July	114.050	2.57
August	112.651	2.66
September	111.694	2.72
October	111.567	2.73
November	111.790	2.71
December	111.080	2.75
Average	110.625	2.80 %

Source: Bloomberg

Union Pacific Corp.

93

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818FV5
Coupon Rate:	3.550%
Maturity Date:	5/20/2061
Amount Outstanding ($ 000)	$640,188
Months Outstanding	7.5

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	101.487	3.48
June	107.306	3.22
July	111.332	3.06
August	110.338	3.10
September	109.565	3.13
October	112.597	3.00
November	112.439	3.01
December	111.359	3.05
Average	109.553	3.13 %

Source: Bloomberg

Prospectus supplement dated May 17, 2021
Interest accrues from May 20, 2021

Union Pacific Corp.

94

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EQ7
Coupon Rate:	3.600%
Maturity Date:	9/15/2037
Amount Outstanding ($ 000)	$495,374
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	113.512	2.59 %
February	109.412	2.88
March	106.716	3.08
April	109.060	2.90
May	109.359	2.88
June	111.974	2.68
July	114.474	2.50
August	113.344	2.58
September	111.847	2.68
October	111.716	2.69
November	112.341	2.64
December	112.121	2.65
Average	111.323	2.73 %

Source: Bloomberg

Union Pacific Corp.

95

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DR6
Coupon Rate:	3.646%
Maturity Date:	2/15/2024
Amount Outstanding ($ 000)	$414,278
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	108.935	0.67 %
February	108.373	0.77
March	107.859	0.86
April	107.815	0.80
May	107.879	0.70
June	107.287	0.83
July	107.118	0.80
August	106.793	0.84
September	106.396	0.91
October	105.743	1.10
November	105.281	1.21
December	104.858	1.31
Average	107.028	0.90 %

Source: Bloomberg

Union Pacific Corp.

96

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FB9
Coupon Rate:	3.700%
Maturity Date:	3/1/2029
Amount Outstanding ($ 000)	$769,694
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	115.175	1.68 %
February	112.604	1.99
March	110.304	2.27
April	111.526	2.10
May	111.785	2.05
June	112.598	1.92
July	113.842	1.74
August	112.976	1.84
September	111.802	1.98
October	111.472	2.01
November	111.090	2.05
December	111.028	2.04
Average	112.184	1.97 %

Source: Bloomberg

Union Pacific Corp.

97

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DV7
Coupon Rate:	3.750%
Maturity Date:	3/15/2024
Amount Outstanding ($ 000)	$398,452
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	109.268	0.74 %
February	108.745	0.83
March	108.189	0.92
April	108.234	0.83
May	108.332	0.72
June	107.588	0.90
July	107.593	0.81
August	107.151	0.89
September	106.812	0.93
October	106.070	1.15
November	105.627	1.25
December	105.288	1.30
Average	107.408	0.94 %

Source: Bloomberg

Union Pacific Corp.

98

Type:	Notes
Description:	UP Corp.
CUSIP:	907818ES3
Coupon Rate:	3.750%
Maturity Date:	7/15/2025
Amount Outstanding ($ 000)	$497,980
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	112.859	0.80 %
February	111.435	1.06
March	110.298	1.27
April	110.942	1.08
May	111.390	0.93
June	111.023	0.96
July	111.064	0.89
August	110.561	0.96
September	109.731	1.11
October	108.746	1.32
November	108.240	1.41
December	107.979	1.43
Average	110.356	1.10 %

Source: Bloomberg

Union Pacific Corp.

99

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FL7
Coupon Rate:	3.750%
Maturity Date:	2/5/2070
Amount Outstanding ($ 000)	$742,196
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	115.619	3.13 %
February	107.647	3.43
March	102.116	3.66
April	103.646	3.59
May	103.968	3.58
June	109.666	3.35
July	113.321	3.21
August	113.837	3.19
September	113.339	3.21
October	116.438	3.09
November	116.840	3.08
December	114.991	3.14
Average	110.952	3.31 %

Source: Bloomberg

Union Pacific Corp.

100

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EM6
Coupon Rate:	3.799%
Maturity Date:	10/1/2051
Amount Outstanding ($ 000)	$707,227
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	117.628	2.92 %
February	111.291	3.22
March	106.430	3.46
April	108.730	3.34
May	109.287	3.31
June	114.419	3.06
July	117.493	2.92
August	116.754	2.95
September	116.209	2.98
October	118.488	2.87
November	117.996	2.89
December	117.710	2.91
Average	114.370	3.07 %

Source: Bloomberg

Union Pacific Corp.

101

Type:	Notes (Exchange)
Description:	UP Corp.
CUSIP:	907818FS2
Coupon Rate:	3.799%
Maturity Date:	4/6/2071
Amount Outstanding ($ 000)	$815,766
Months Outstanding	3.0

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	Not Traded	-
June	Not Traded	-
July	Not Traded	-
August	Not Traded	-
September	Not Traded	-
October	117.706	3.10
November	118.348	3.07
December	116.665	3.13
Average	117.573	3.10 %

Source: Bloomberg

Exchange Offer, 424B3, Prospectus Dated September 3, 2021,

Note: This is the Exchange traded portion of the notes, the 144A portion is shown on the next page

101	$815,766
102	7274
	$823,040

Union Pacific Corp.

102

Type:	Notes (Exchange)
Description:	UP Corp. 144A
CUSIP:	907818FR4
Coupon Rate:	3.799%
Maturity Date:	4/6/2071
Amount Outstanding ($ 000)	$7,274
Months Outstanding	9.0

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	104.168	3.62
May	103.997	3.63
June	111.006	3.34
July	115.855	3.16
August	114.609	3.21
September	114.211	3.22
October	117.417	3.11
November	117.437	3.11
December	116.276	3.15
Average	112.775	3.28 %

Source: Bloomberg

Note: These are Rule 144-A notes, which trade among qualified institutional buyers.

102	$7,274
101	815766
	$823,040

Union Pacific Corp.

103

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FG8
Coupon Rate:	3.839%
Maturity Date:	3/20/2060
Amount Outstanding ($ 000)	$1,412,079
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	118.673	3.02 %
February	110.789	3.34
March	105.644	3.57
April	107.917	3.47
May	107.780	3.47
June	113.379	3.23
July	117.681	3.06
August	116.149	3.12
September	115.921	3.13
October	118.866	3.01
November	118.293	3.03
December	117.765	3.05
Average	114.071	3.21 %

Source: Bloomberg

Note: This is the exchange-traded portion of these notes. The Rule 144-A notes similar to these have a different CUSIP, and are shown on the next page.

103	$1,412,079
104	184
	$1,412,263

Union Pacific Corp.

104

Type:	Notes
Description:	UP Corp. 144A
CUSIP:	907818FF0
Coupon Rate:	3.839%
Maturity Date:	3/20/2060
Amount Outstanding ($ 000)	$184
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	118.949	3.01 %
February	111.840	3.30
March	103.780	3.66
April	106.960	3.51
May	107.671	3.48
June	112.238	3.28
July	115.856	3.13
August	115.439	3.15
September	116.456	3.10
October	119.449	2.98
November	121.313	2.91
December	117.176	3.07
Average	113.927	3.22 %

Source: Bloomberg

Note: These are Rule 144-A notes, which trade among qualified institutional buyers.

104	$184
103	1412079
	$1,412,263

Union Pacific Corp.

105

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EC8
Coupon Rate:	3.875%
Maturity Date:	2/1/2055
Amount Outstanding ($ 000)	$444,156
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	117.908	3.03 %
February	110.138	3.37
March	105.323	3.60
April	108.145	3.46
May	108.342	3.45
June	113.549	3.21
July	116.585	3.08
August	115.787	3.11
September	115.894	3.11
October	118.441	3.00
November	118.930	2.97
December	116.808	3.06
Average	113.821	3.20 %

Source: Bloomberg

Union Pacific Corp.

106

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EY0
Coupon Rate:	3.950%
Maturity Date:	9/10/2028
Amount Outstanding ($ 000)	$1,047,347
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	116.911	1.58 %
February	114.405	1.89
March	112.243	2.16
April	113.772	1.93
May	114.080	1.87
June	114.734	1.76
July	115.682	1.61
August	114.560	1.74
September	113.553	1.86
October	113.022	1.91
November	112.105	2.03
December	112.381	1.96
Average	113.954	1.86 %

Source: Bloomberg

Union Pacific Corp.

107

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FE3
Coupon Rate:	3.950%
Maturity Date:	8/15/2059
Amount Outstanding ($ 000)	$491,213
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	121.026	3.02 %
February	112.402	3.37
March	106.917	3.62
April	109.703	3.49
May	109.640	3.49
June	116.156	3.21
July	120.050	3.06
August	118.780	3.10
September	118.152	3.13
October	120.867	3.02
November	121.090	3.01
December	119.199	3.08
Average	116.165	3.22 %

Source: Bloomberg

Union Pacific Corp.

108

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EN4
Coupon Rate:	4.000%
Maturity Date:	4/15/2047
Amount Outstanding ($ 000)	$489,321
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	119.567	2.93 %
February	113.153	3.25
March	108.876	3.48
April	111.615	3.33
May	111.554	3.33
June	115.927	3.10
July	118.963	2.94
August	118.248	2.98
September	117.495	3.01
October	120.062	2.88
November	120.543	2.86
December	118.990	2.93
Average	116.249	3.09 %

Source: Bloomberg

Union Pacific Corp.

109

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EF1
Coupon Rate:	4.050%
Maturity Date:	11/15/2045
Amount Outstanding ($ 000)	$395,762
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	119.003	2.96 %
February	113.447	3.25
March	109.067	3.50
April	111.635	3.35
May	111.464	3.36
June	114.852	3.17
July	118.727	2.96
August	118.161	2.99
September	117.371	3.03
October	120.940	2.84
November	121.168	2.83
December	118.882	2.94
Average	116.226	3.10 %

Source: Bloomberg

Union Pacific Corp.

110

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EJ3
Coupon Rate:	4.050%
Maturity Date:	3/1/2046
Amount Outstanding ($ 000)	$515,421
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	119.967	2.92 %
February	114.015	3.23
March	108.884	3.51
April	114.059	3.22
May	112.323	3.32
June	115.748	3.13
July	118.668	2.97
August	117.853	3.01
September	117.426	3.03
October	119.972	2.90
November	120.751	2.86
December	118.965	2.95
Average	116.553	3.09 %

Source: Bloomberg

Union Pacific Corp.

111

Type:	Notes
Description:	UP Corp.
CUSIP:	907818ER5
Coupon Rate:	4.100%
Maturity Date:	9/15/2067
Amount Outstanding ($ 000)	$494,430
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	121.818	3.20 %
February	114.348	3.48
March	106.769	3.79
April	110.275	3.64
May	110.855	3.62
June	116.679	3.38
July	121.871	3.19
August	120.568	3.24
September	119.213	3.29
October	123.528	3.13
November	123.568	3.13
December	122.049	3.18
Average	117.628	3.36 %

Source: Bloomberg

Union Pacific Corp.

112

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DZ8
Coupon Rate:	4.150%
Maturity Date:	1/15/2045
Amount Outstanding ($ 000)	$228,875
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	120.293	2.96 %
February	114.548	3.27
March	110.422	3.50
April	112.568	3.38
May	112.118	3.40
June	115.208	3.22
July	118.158	3.06
August	116.673	3.14
September	115.196	3.22
October	117.988	3.06
November	119.566	2.97
December	118.334	3.04
Average	115.923	3.19 %

Source: Bloomberg

Union Pacific Corp.

113

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DP0
Coupon Rate:	4.250%
Maturity Date:	4/15/2043
Amount Outstanding ($ 000)	$183,460
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	118.495	3.09 %
February	113.615	3.37
March	109.139	3.64
April	112.514	3.43
May	112.725	3.42
June	115.830	3.23
July	118.721	3.06
August	118.101	3.10
September	116.468	3.19
October	116.987	3.15
November	117.857	3.10
December	115.628	3.23
Average	115.507	3.25 %

Source: Bloomberg

Union Pacific Corp.

114

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DL9
Coupon Rate:	4.300%
Maturity Date:	6/15/2042
Amount Outstanding ($ 000)	$204,297
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	117.793	3.15 %
February	114.131	3.37
March	109.769	3.64
April	112.983	3.43
May	111.893	3.50
June	115.623	3.27
July	120.439	2.98
August	118.899	3.06
September	116.964	3.18
October	116.387	3.21
November	117.603	3.13
December	115.465	3.26
Average	115.662	3.27 %

Source: Bloomberg

Union Pacific Corp.

115

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FC7
Coupon Rate:	4.300%
Maturity Date:	3/1/2049
Amount Outstanding ($ 000)	$626,716
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	126.937	2.89 %
February	119.311	3.25
March	114.521	3.48
April	117.010	3.36
May	117.258	3.34
June	122.172	3.10
July	125.646	2.94
August	124.425	2.99
September	123.600	3.03
October	126.210	2.90
November	126.618	2.88
December	124.902	2.96
Average	122.384	3.09 %

Source: Bloomberg

Union Pacific Corp.

116

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EV6
Coupon Rate:	4.375%
Maturity Date:	9/10/2038
Amount Outstanding ($ 000)	$230,968
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	122.933	2.73 %
February	119.034	2.97
March	116.426	3.14
April	118.083	3.03
May	117.141	3.09
June	119.006	2.96
July	121.715	2.77
August	121.453	2.78
September	118.756	2.96
October	119.167	2.93
November	119.557	2.90
December	117.689	3.02
Average	119.247	2.94 %

Source: Bloomberg

Union Pacific Corp.

117

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EG9
Coupon Rate:	4.375%
Maturity Date:	11/15/2065
Amount Outstanding ($ 000)	$169,327
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	128.098	3.19 %
February	120.551	3.47
March	114.504	3.71
April	117.372	3.59
May	113.348	3.76
June	117.869	3.57
July	122.024	3.41
August	120.645	3.46
September	120.618	3.46
October	122.450	3.39
November	124.442	3.32
December	122.341	3.39
Average	120.355	3.48 %

Source: Bloomberg

Union Pacific Corp.

118

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EW4
Coupon Rate:	4.500%
Maturity Date:	9/10/2048
Amount Outstanding ($ 000)	$385,927
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	128.692	2.97 %
February	122.404	3.26
March	117.943	3.48
April	120.149	3.37
May	119.618	3.39
June	123.960	3.18
July	127.753	3.00
August	126.840	3.04
September	125.997	3.07
October	128.912	2.94
November	129.926	2.89
December	127.966	2.97
Average	125.013	3.13 %

Source: Bloomberg

Union Pacific Corp.

119

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DJ4
Coupon Rate:	4.750%
Maturity Date:	9/15/2041
Amount Outstanding ($ 000)	$212,391
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	127.408	2.96 %
February	120.805	3.34
March	117.099	3.57
April	119.628	3.41
May	119.871	3.39
June	123.108	3.19
July	127.242	2.95
August	124.467	3.10
September	123.235	3.17
October	125.042	3.06
November	123.997	3.12
December	122.775	3.18
Average	122.890	3.20 %

Source: Bloomberg

Union Pacific Corp.

120

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DU9
Coupon Rate:	4.750%
Maturity Date:	12/15/2043
Amount Outstanding ($ 000)	$182,720
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	122.607	3.33 %
February	117.834	3.60
March	112.633	3.91
April	116.215	3.69
May	116.296	3.68
June	121.965	3.35
July	125.372	3.16
August	123.552	3.26
September	123.359	3.26
October	123.490	3.25
November	124.284	3.21
December	122.973	3.27
Average	120.882	3.41 %

Source: Bloomberg

Union Pacific Corp.

121

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EX2
Coupon Rate:	4.800%
Maturity Date:	9/10/2058
Amount Outstanding ($ 000)	$25,782
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	128.754	3.43 %
February	122.454	3.69
March	115.512	4.00
April	116.369	3.96
May	115.855	3.98
June	120.574	3.77
July	123.107	3.66
August	121.817	3.71
September	120.265	3.78
October	123.218	3.65
November	123.187	3.65
December	121.413	3.72
Average	121.044	3.75 %

Source: Bloomberg

Union Pacific Corp.

122

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DT2
Coupon Rate:	4.821%
Maturity Date:	2/1/2044
Amount Outstanding ($ 000)	$128,660
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	126.501	3.19 %
February	121.283	3.47
March	115.908	3.78
April	119.361	3.57
May	120.070	3.53
June	123.749	3.32
July	126.735	3.15
August	125.578	3.21
September	123.779	3.31
October	125.986	3.18
November	126.213	3.17
December	125.424	3.21
Average	123.382	3.34 %

Source: Bloomberg

Note: This is the exchange-traded portion of these notes. The Rule 144-A notes similar to these have a different CUSIP, and are shown on the next page.

122	$128,660
123	1
	$128,661

Union Pacific Corp.

123

Type:	Notes
Description:	UP Corp. 144A
CUSIP:	907818DS4
Coupon Rate:	4.821%
Maturity Date:	2/1/2044
Amount Outstanding ($ 000)	$1
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	116.280	3.75
April	119.178	3.58
May	120.212	3.52
June	125.879	3.20
July	127.523	3.11
August	126.707	3.15
September	123.780	3.31
October	126.529	3.15
November	125.597	3.20
December	125.145	3.22
Average	123.683	3.32 %

Source: Bloomberg

Note: These are Rule 144-A notes, which trade among qualified institutional buyers.

123	$1
122	128660
	$128,661

Union Pacific Corp.

124

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DX3
Coupon Rate:	4.850%
Maturity Date:	6/15/2044
Amount Outstanding ($ 000)	$83,294
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	127.039	3.20 %
February	121.841	3.47
March	116.392	3.78
April	119.850	3.58
May	120.583	3.54
June	123.846	3.35
July	125.971	3.23
August	125.307	3.27
September	123.331	3.37
October	125.512	3.25
November	125.974	3.22
December	124.818	3.28
Average	123.372	3.38 %

Source: Bloomberg

Union Pacific Corp.

125

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DF2
Coupon Rate:	5.780%
Maturity Date:	7/15/2040
Amount Outstanding ($ 000)	$63,878
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	135.413	3.30 %
February	130.549	3.58
March	125.385	3.90
April	128.775	3.68
May	129.388	3.63
June	132.136	3.46
July	134.570	3.31
August	133.763	3.35
September	131.812	3.46
October	133.417	3.36
November	133.322	3.36
December	131.999	3.43
Average	131.711	3.49 %

Source: Bloomberg

Note: This is the exchange-traded portion of these notes. The Rule 144-A notes similar to these have a different CUSIP, and are shown on the next page.

125	$63,878
126	10
	$63,888

Union Pacific Corp.

126

Type:	Notes
Description:	UP Corp. 144A
CUSIP:	907818DE5
Coupon Rate:	5.780%
Maturity Date:	7/15/2040
Amount Outstanding ($ 000)	$10
Months Outstanding	12.0

End of Month in 2021	Price	Yield
January	131.447	3.53 %
February	130.458	3.59
March	126.310	3.84
April	128.495	3.69
May	127.681	3.74
June	130.725	3.55
July	133.273	3.39
August	132.505	3.43
September	130.084	3.57
October	129.799	3.58
November	130.259	3.55
December	127.973	3.68
Average	129.917	3.60 %

Source: Bloomberg

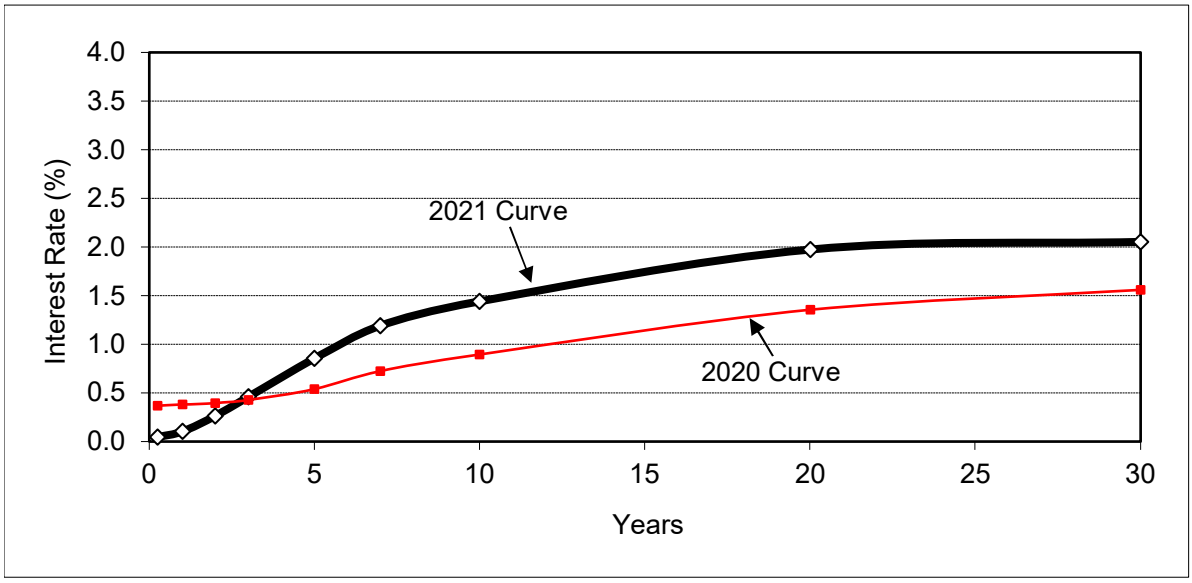
Note: These are Rule 144-A notes, which trade among qualified institutional buyers.

126	$10
125	63878
	$63,888

Interest Rates on Selected Government Instruments

Yield in Percent Per Annum, Constant Maturity Rates for 2021

	3 Mo.	1 Yr	2 Yr	3 Yr	5 Yr	7 Yr	10 Yr	20 Yr	30 Yr
January	0.08	0.10	0.13	0.20	0.45	0.77	1.08	1.63	1.82
February	0.04	0.07	0.12	0.21	0.54	0.91	1.26	1.88	2.04
March	0.03	0.08	0.15	0.32	0.82	1.27	1.61	2.24	2.34
April	0.02	0.06	0.16	0.35	0.86	1.31	1.64	2.20	2.30
May	0.02	0.05	0.16	0.32	0.82	1.28	1.62	2.22	2.32
June	0.04	0.07	0.20	0.39	0.84	1.23	1.52	2.09	2.16
July	0.05	0.08	0.22	0.40	0.76	1.07	1.32	1.87	1.94
August	0.05	0.07	0.22	0.42	0.77	1.06	1.28	1.83	1.92
September	0.04	0.08	0.24	0.47	0.86	1.16	1.37	1.87	1.94
October	0.05	0.11	0.39	0.67	1.11	1.40	1.58	2.03	2.06
November	0.05	0.18	0.51	0.82	1.20	1.45	1.56	1.97	1.94
December	0.06	0.30	0.68	0.95	1.23	1.40	1.47	1.90	1.85
Average	**0.04**	**0.10**	**0.27**	**0.46**	**0.86**	**1.19**	**1.44**	**1.98**	**2.05**



Source: Federal Reserve statistical release H.15, Treasury Constant Maturities, Nominal

Equipment Trust Certificates for CSX

Modeled ETCs

	ETC ID	Maturity	Balance For 2021 ($000) Beg.	Ending	Avg O/S	Current Valuation Interest Rate	Valuation Factor	Current Market Value	Interest
1.	[None]				--			--	--
2.					--			--	--
3.					--			--	--
4.					--			--	--
5.					--			--	--
6.					--			--	--
7.					--			--	--
8.					--			--	--
9.					--			--	--
10.					--			--	--
11.					--			--	--
12.					--			--	--
13.					--			--	--
14.					--			--	--
15.					--			--	--
	Total		$0	$0	$0	--		**$0**	$0

Non-Modeled ETCs

	ETC ID	Maturity	Balance For 2021 ($000) Beg.	Ending
1.	[None]			
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
	Total		$0	$0

Equipment Trust Certificates for CSX (continued)

Entire ETC Current – Not Used for Cost or Market Value

	ETC ID	Maturity	Balance 2021 ($000) Beg.	Ending
1.	[None]			
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
	Total		$0	$0

Grand Totals (for reconciliation to carrier data)

	Balance For 2021 ($000) Beg.	Ending
Total Modeled	$0	$0
Total Non-Modeled	0	0
Sub Total	0	0
Total All Current	0	0
Grand Total	$0	$0
From CSX:		
Total ETCs		$0
Difference		$0

Equipment Trust Certificates for NS

Modeled ETCs

	ETC ID	Maturity	Balance For 2021 ($000) Beg.	Ending	Avg O/S	Current Valuation Interest Rate	Valuation Factor	Current Market Value	Interest
1.	[None]				--			--	--
2.					--			--	--
3.					--			--	--
4.					--			--	--
5.					--			--	--
6.					--			--	--
7.					--			--	--
8.					--			--	--
9.					--			--	--
10.					--			--	--
11.					--			--	--
12.					--			--	--
13.					--			--	--
14.					--			--	--
15.					--			--	--
	Total		$0	$0	$0	--		**$0**	$0

Non-Modeled ETCs

	ETC ID	Maturity	Balance For 2021 ($000) Beg.	Ending
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
	Total		$0	$0

Equipment Trust Certificates for NS (continued)

Entire ETC Current – Not Used for Cost or Market Value

	ETC ID	Maturity	Balance 2021 ($000) Beg.	Ending
1.	[None]			
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
	Total		$0	$0

Grand Totals (for reconciliation to carrier data)

	Balance For 2021 ($000) Beg.	Ending
Total Modeled	$0	$0
Total Non-Modeled	0	0
Sub Total	0	0
Total All Current	0	0
Grand Total	$0	$0
From NS:		
Total ETCs		$0
Difference		$0

Equipment Trust Certificates for UP

Modeled ETCs

	ETC ID	Maturity	Balance For 2021 ($000) Beg.	Ending	Avg O/S	Current Valuation Interest Rate	Valuation Factor	Current Market Value	Interest
1.	ETC UPC Series J	1/2/2031	27,814	26,139	26,977	2.043%	1.22925	33,161	677
2.	ETC UPC Series A	5/14/2026	395,218	378,348	386,783	1.575%	1.05589	408,399	6,434
3.	ETC UPC Series 2015 A	5/12/2027	328,552	315,133	321,843	1.715%	1.03769	333,973	5,729
4.	ETC UPC Series 2016 A	11/9/2029	129,104	123,997	126,551	1.907%	1.02800	130,094	2,481
5.					--			--	--
6.					--			--	--
7.					--			--	--
8.					--			--	--
9.					--			--	--
10.					--			--	--
11.					--			--	--
12.					--			--	--
13.					--			--	--
14.					--			--	--
15.					--			--	--
	Total		$880,688	$843,617	$862,153	**1.692%**		**$905,627**	$15,321

Non-Modeled ETCs

	ETC ID	Maturity	Balance For 2021 ($000) Beg.	Ending
1.	[None]			
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
	Total		$0	$0

Equipment Trust Certificates for UP (continued)

Entire ETC Current – Not Used for Cost or Market Value

	ETC ID	Maturity	Balance 2021 ($000) Beg.	Ending
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
	Total		$0	$0

Grand Totals (for reconciliation to carrier data)

	Balance For 2021 ($000) Ending
Total Modeled	$843,617
Total Non-Modeled	0
Sub Total	843,617
Total All Current	0
Grand Total	$843,617
From UP:	
Total ETCs	$843,617
Difference	$0

2021 Market Value of Debt ($000)

Type of Debt	Market Value: Traded or Modeled	Market Value: Non-Traded or Non-Modeled	Market Value: Total	Percent of: Subtotal	Percent of: Total
Bonds, Notes & Debentures	$60,899,233	$441,679	$61,340,912	98.55%	99.41%
Equipment Trust Certificates	905,627		905,627	1.45%	1.47%
Conditional Sales Agreements	0		0	0.00%	0.00%
Sub Total	$61,804,860	$441,679	$62,246,539	100.00%	100.88%
All Other — Capital Leases		$351,094	$351,094	-64.91%	0.57%
All Other — Misc. Debt		-891,989	-891,989	164.91%	-1.45%
All Other — Non-Modeled ETC		0	0	0.00%	0.00%
All Other — Non-Modeled CSA		0	0	0.00%	0.00%
Sub Total			-$540,895	100.00%	-0.88%
Total Market Value			**$61,705,644**		100.00%

General Notes:

Bonds, Notes, and Debentures from Appendix A. Securities that did not trade were assigned a market value equal to their book value. The traded portion accounts for 99.28 percent of the total market value for this category.

Equipment Trust Certificates from Appendix C.

All Conditional Sales Agreements have been retired.

Capital Leases and Miscellaneous Debt listed in work papers.

The capital leases and miscellaneous debt portion of the All Other debt category was assigned a market value equal to its book value, and totals to -$540,895 thousand. The non-modeled ETCs and CSAs are typically also assigned a market value equal to their book value, but there were none for this year. The All Other category totals to -$540,895 thousand, or -0.9 percent of total debt.

If negative numbers appear in Miscellaneous Debt, they typically are related to debt premiums and discounts.

2021 Flotation Costs for Bonds

	NSC Sr Notes	NSC Sr Notes	NSC Sr Notes	UNP Sr Notes	UNP Sr Notes	UNP Sr Notes
From 424(b)	**5/3/2021**	**5/3/2021**	**8/16/2021**	**5/17/2021**	**5/17/2021**	**5/17/2021**
Face Amount	$500,000,000	$600,000,000	$600,000,000	$850,000,000	$1,000,000,000	$650,000,000
Coupon Rate	2.300%	4.100%	2.900%	2.375%	3.200%	3.550%
Maturity Date	5/15/2031	5/15/2121	8/15/2051	5/20/2031	5/20/2041	5/20/2061
Frequency of Coupon Payment	2	2	2	2	2	2
Interest Accrual Date	5/12/2021	5/12/2021	8/25/2021	5/20/2021	5/20/2021	5/20/2021
Price To Investors	99.849	99.737	99.206	100.000	99.971	99.491
Proceeds from Sale (before expenses)	$499,245,000	$598,422,000	$595,236,000	$850,000,000	$999,710,000	$646,691,500
Underwriter Fee as % of Gross Proceeds	0.650%	1.000%	0.875%	0.650%	0.750%	0.875%
Underwriter's Fee	$3,250,000	$6,000,000	$5,250,000	$5,525,000	$7,500,000	$5,687,500
Railroad Expenses Excluding Fee	$863,636.36	$1,036,363.64	$1,200,000.00	$34,000.00	$40,000.00	$26,000.00
Page in 424(b) for Expenses	S-19	S-19	S-15	S-11	S-11	S-11
Calculated						
Yield Based on Price to Investors	2.317%	4.111%	2.940%	2.375%	3.202%	3.574%
Issue Price Per $100 Less Flotation	$99.03	$98.56	$98.13	$99.35	$99.22	$98.61
Yield on New Issue Including Flotation	2.410%	4.161%	2.995%	2.449%	3.254%	3.616%
Flotation Costs (Diff. in Pct Pts)	**0.093%**	**0.050%**	**0.055%**	**0.074%**	**0.052%**	**0.042%**
Avg. Flotation Cost (Pct. Points)	**0.060%**					
(includes costs on page 2 and 3)						
Previous Year's Average	0.057%					

Source: SEC 424(b)(5) or 424(b)(2) filings.

In cases where multiple series of notes were issued with one set of expenses (excluding underwriting fee), the expenses are allocated by the face amount of the notes involved.

2021 Flotation Costs for Bonds

	UNP Sr Notes*	UNP Sr Notes
From 424(b)	**9/7/2021**	**9/7/2021**
Face Amount	$150,000,000	$850,000,000
Coupon Rate	2.375%	2.950%
Maturity Date	5/20/2031	3/10/2052
Frequency of Coupon Payment	2	2
Interest Accrual Date	5/20/2021	9/10/2021
Price To Investors	103.230	99.98
Proceeds from Sale (before expenses)	$154,845,000	$849,830,000
Underwriter Fee as % of Gross Proceeds	0.650%	0.875%
Underwriter's Fee	$975,000	$7,437,500
Railroad Expenses Excluding Fee	$15,000.00	$85,000.00
Page in 424(b) for Expenses	S-13	S-13
Calculated		
Yield Based on Price to Investors	2.017%	2.951%
Issue Price Per $100 Less Flotation	$102.57	$99.10
Yield on New Issue Including Flotation	2.089%	2.995%
Flotation Costs (Diff. in Pct Pts)	**0.072%**	**0.044%**

Source: SEC 424(b)(5) or 424(b)(2) filings.

* The 2031 UNP Sr Notes are a further issuance of the 2.375% senior notes issued May 2021 (Appendix E Page 1 current year filing).

Example of Source for Bond Flotation Costs

Filed Pursuant to Rule 424(b)(5)
Registration No. 333-252723

PROSPECTUS SUPPLEMENT
(To Prospectus Dated February 4, 2021)

$1,100,000,000

NORFOLK SOUTHERN®

$500,000,000 2.300% Senior Notes due 2031
$600,000,000 4.100% Senior Notes due 2121

We are offering $500 million aggregate principal amount of our 2.300% senior notes due 2031 (the "2031 Notes") and $600 million aggregate principal amount of our 4.100% senior notes due 2121 (the "2121 Notes" and, together with the 2031 Notes, the "Notes"). The 2031 Notes will bear interest at a rate of 2.300% per year. We will pay interest semi-annually in arrears on the 2031 Notes on May 15 and November 15 of each year, beginning on November 15, 2021. The 2031 Notes will mature on May 15, 2031. The 2121 Notes will bear interest at a rate of 4.100% per year. We will pay interest semi-annually in arrears on the 2121 Notes on May 15 and November 15 of each year, beginning on November 15, 2021. The 2121 Notes will mature on May 15, 2121. We may redeem the Notes of any series prior to maturity in whole at any time or in part from time to time, at our option, as described in this prospectus supplement.

The Notes will be unsecured obligations and rank equally with our other unsecured senior indebtedness. The Notes of each series will be issued only in registered form in denominations of $2,000 and integral multiples of $1,000 in excess thereof.

As described under "Use of Proceeds," we intend to allocate an amount equal to the net proceeds from the sale of the 2031 Notes to finance or refinance, in whole or in part, new or existing Eligible Projects (as defined herein).

Investing in the Notes involves risks that are described in the "Risk Factors" section beginning on page S-4 of this prospectus supplement and similar sections in our filings with the Securities and Exchange Commission that are incorporated or deemed incorporated by reference herein.

	Per 2031 Note	Total	Per 2121 Note	Total
Price to Public (1)	99.849%	$499,245,000	99.737%	$598,422,000
Underwriting Discount	0.650%	$ 3,250,000	1.000%	$ 6,000,000
Proceeds to us (before expenses) (1)	99.199%	$495,995,000	98.737%	$592,422,000

(1) Plus accrued interest, if any, from May 12, 2021.

The Securities and Exchange Commission and state securities regulators have not approved or disapproved these securities or determined if this prospectus supplement or the accompanying prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The Notes will be ready for delivery in book-entry form through the facilities of The Depository Trust Company and its participants, including Euroclear Bank, SA/NV, and Clearstream Banking, S.A., on or about May 12, 2021.

Joint Book-Running Managers

BofA Securities **Morgan Stanley** **Wells Fargo Securities**

Example of Source for Bond Flotation Costs

UNDERWRITING

Under the terms and subject to the conditions contained in the underwriting agreement dated the date of this prospectus supplement, the underwriters named below, for whom BofA Securities, Inc., Morgan Stanley & Co. LLC and Wells Fargo Securities, LLC are acting as representatives, have severally and not jointly agreed to purchase, and we have agreed to sell to them, severally, the respective principal amounts of the Notes set forth opposite their names below:

Underwriters	Principal Amount of 2031 Notes	Principal Amount of 2121 Notes
BofA Securities, Inc.	$125,000,000	$150,000,000
Morgan Stanley & Co. LLC	125,000,000	150,000,000
Wells Fargo Securities, LLC	125,000,000	150,000,000
Capital One Securities, Inc.	20,834,000	25,000,000
Fifth Third Securities, Inc.	20,834,000	25,000,000
MUFG Securities Americas Inc.	20,833,000	25,000,000
PNC Capital Markets LLC	20,833,000	25,000,000
Siebert Williams Shank & Co., LLC	20,833,000	25,000,000
SMBC Nikko Securities America, Inc.	20,833,000	25,000,000
Total	$500,000,000	$600,000,000

The underwriting agreement provides that the obligations of the underwriters to pay for and accept delivery of the Notes offered hereby are subject to the approval of certain legal matters by their counsel and to certain other conditions. The underwriters are obligated to take and pay for all of the Notes if any Notes are taken. The offering of the Notes by the underwriters is subject to receipt and acceptance and subject to the underwriters' right to reject any order in whole or in part.

The underwriters have advised us that they propose initially to offer the Notes to the public at the public offering prices on the cover page of this prospectus supplement, and to dealers at that price less a concession not in excess of 0.400% of the principal amount of the 2031 Notes and 0.600% of the principal amount of the 2121 Notes. The underwriters may allow, and the dealers may reallow, a discount not in excess of 0.250% of the principal amount of the 2031 Notes and 0.300% of the principal amount of the 2121 Notes to other dealers. After the Notes are released to the public, the offering prices and other selling terms may from time to time be varied by the underwriters.

The expenses of the offering payable by us, not including the underwriting discounts, are estimated to be $1.9 million.

We have agreed to indemnify the several underwriters against certain liabilities, including liabilities under the Securities Act, or to contribute to payments that the underwriters may be required to make in respect of those liabilities.

In order to facilitate the offering of these securities, the underwriters may engage in transactions that stabilize, maintain or otherwise affect the price of the Notes or any other notes the prices of which may be used to determine payments on the Notes. Specifically, the underwriters may sell more Notes than they are obligated to purchase in connection with the offering, creating a short position for their own accounts. A short sale is covered by purchasing the Notes in the open market. A short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the Notes in the open market after pricing that could adversely affect investors who purchase in the offering. As an additional means of facilitating the offering, the underwriters may bid for, and purchase, the Notes or any other notes in the open market to stabilize the price of the Notes or of any other notes. Finally, in any offering of the Notes through a syndicate of underwriters or dealer group, the underwriters acting on behalf of the underwriting syndicate or for themselves may impose a penalty bid, whereby the underwriters reclaim selling concessions allowed to an underwriter or a dealer for distributing the Notes in the offering, if the underwriters repurchase previously distributed Notes to cover

2021 Current Cost of Debt

Type of Debt	Cost Reference	Appendix D Weight	Current Cost	Weighted Cost
Type of Instrument				
Bonds, Notes & Debentures	App. A & Table 3	98.55%	2.585%	2.547%
Equipment Trust Certificates	App. C & Table 5	1.45%	1.692%	0.025%
Conditional Sales Agreements	Railroad Data	0.00%	--	--
Total Without Floatation Costs		100.00%		2.572%
Floatation Costs				
Bonds, Notes & Debentures	App. F & Table 8	98.55%	0.060%	0.059%
Equipment Trust Certificates	Tables 7 and 8	1.45%	0.068%	0.001%
Conditional Sales Agreements	Table 8	0.00%	not	--
Total Floatation Costs		100.00%		0.060%
Weighted Cost of Debt				2.632%
Weighted Cost of Debt (rounded)				**2.63%**

Historical Weighted Cost of Debt (for comparison purposes only)

Item	Year	Reference	Weighted Cost
Previous Year	2020	EP 558 (Sub-No. 24) Served August 6, 2021	2.54%
Highest	1982	EP 436 Decided July 22, 1983	14.0%
Lowest	2020	EP 558 (Sub-No. 24) Served August 6, 2021	2.54%

Market Value for Common Equity

CSX Data from Bloomberg 1-10-2022

Bloomberg's stock prices had already been adjusted for the split, but the shares outstanding need to also be adjusted, done below.

End of Wk. Date	End of Wk Close	Shares Outstanding	Capitalization ($000)	
Friday, January 8, 2021	31.95	2,294,324,874	73,296,108	
Friday, January 15, 2021	31.14	2,294,324,874	71,445,277	
Friday, January 22, 2021	29.21	2,294,324,874	67,024,801	
Friday, January 29, 2021	28.59	2,294,324,874	65,583,277	
Friday, February 5, 2021	29.52	2,287,515,174	67,519,899	
Friday, February 12, 2021	30.05	2,287,515,174	68,732,282	
Friday, February 19, 2021	30.70	2,287,515,174	70,219,167	
Friday, February 26, 2021	30.52	2,287,515,174	69,807,414	
Friday, March 5, 2021	30.54	2,287,515,174	69,868,262	
Friday, March 12, 2021	31.28	2,287,515,174	71,561,023	
Friday, March 19, 2021	30.26	2,287,515,174	69,212,660	
Friday, March 26, 2021	32.55	2,287,515,174	74,466,168	
Thursday, April 1, 2021	32.42	2,272,200,648	73,664,745	
Friday, April 9, 2021	32.76	2,272,200,648	74,444,791	
Friday, April 16, 2021	32.88	2,272,200,648	74,709,957	
Friday, April 23, 2021	34.37	2,272,200,648	78,095,536	
Friday, April 30, 2021	33.58	2,272,200,648	76,307,996	
Friday, May 7, 2021	34.38	2,272,200,648	78,110,760	
Friday, May 14, 2021	33.90	2,272,200,648	77,035,100	
Friday, May 21, 2021	32.76	2,272,200,648	74,444,791	
Friday, May 28, 2021	33.37	2,272,200,648	75,830,834	
Friday, June 4, 2021	33.21	2,272,200,648	75,452,285	
Friday, June 11, 2021	32.41	2,272,200,648	73,642,023	
Friday, June 18, 2021	31.58	2,272,200,648	71,763,595	
Friday, June 25, 2021	31.97	2,272,200,648	72,642,255	3:1 Stock Split 6/29/2021
Friday, July 2, 2021	32.58	2,254,495,910	73,451,477	
Friday, July 9, 2021	31.83	2,254,495,910	71,760,605	
Friday, July 16, 2021	31.51	2,254,495,910	71,039,166	
Friday, July 23, 2021	32.81	2,254,495,910	73,970,011	
Friday, July 30, 2021	32.32	2,254,495,910	72,865,308	
Friday, August 6, 2021	32.30	2,254,495,910	72,820,218	
Friday, August 13, 2021	33.87	2,254,495,910	76,359,776	
Friday, August 20, 2021	33.73	2,254,495,910	76,044,147	
Friday, August 27, 2021	33.45	2,254,495,910	75,412,888	
Friday, September 3, 2021	32.00	2,254,495,910	72,143,869	
Friday, September 10, 2021	30.95	2,254,495,910	69,776,648	
Friday, September 17, 2021	30.31	2,254,495,910	68,333,771	
Friday, September 24, 2021	30.42	2,254,495,910	68,581,766	
Friday, October 1, 2021	30.34	2,217,983,411	67,293,617	
Friday, October 8, 2021	32.71	2,217,983,411	72,550,237	
Friday, October 15, 2021	34.16	2,217,983,411	75,766,313	
Friday, October 22, 2021	35.42	2,217,983,411	78,560,972	
Friday, October 29, 2021	36.17	2,217,983,411	80,224,460	
Friday, November 5, 2021	35.41	2,217,983,411	78,538,793	
Friday, November 12, 2021	35.23	2,217,983,411	78,139,556	
Friday, November 19, 2021	36.08	2,217,983,411	80,024,841	
Friday, November 26, 2021	35.57	2,217,983,411	78,893,670	
Friday, December 3, 2021	35.84	2,217,983,411	79,492,525	
Friday, December 10, 2021	36.74	2,217,983,411	81,488,711	
Friday, December 17, 2021	35.72	2,217,983,411	79,226,367	
Thursday, December 23, 2021	36.79	2,217,983,411	81,599,610	
Friday, December 31, 2021	37.60	2,217,983,411	83,396,176	

Note: Capitalization calulated using close of week price multiplied by the number of shares outstanding.

Market Value for Common Equity

NSC Data from Bloomberg 1-10-2022

End of Wk. Date	End of Wk Close	Shares Outstanding	Capitalization ($000)
Friday, January 8, 2021	254.04	253,985,338	64,522,435
Friday, January 15, 2021	252.95	253,985,338	64,245,591
Friday, January 22, 2021	244.22	253,985,338	62,028,299
Friday, January 29, 2021	236.62	253,985,338	60,098,011
Friday, February 5, 2021	245.66	251,911,634	61,884,612
Friday, February 12, 2021	254.84	251,911,634	64,197,161
Friday, February 19, 2021	258.03	251,911,634	65,000,759
Friday, February 26, 2021	252.06	251,911,634	63,496,846
Friday, March 5, 2021	256.00	251,911,634	64,489,378
Friday, March 12, 2021	261.44	251,911,634	65,859,778
Friday, March 19, 2021	260.46	251,911,634	65,612,904
Friday, March 26, 2021	272.91	251,911,634	68,749,204
Thursday, April 1, 2021	271.18	250,241,009	67,860,357
Friday, April 9, 2021	272.49	250,241,009	68,188,173
Friday, April 16, 2021	270.86	250,241,009	67,780,280
Friday, April 23, 2021	282.00	250,241,009	70,567,965
Friday, April 30, 2021	279.24	250,241,009	69,877,299
Friday, May 7, 2021	289.81	250,241,009	72,522,347
Friday, May 14, 2021	289.83	250,241,009	72,527,352
Friday, May 21, 2021	277.34	250,241,009	69,401,841
Friday, May 28, 2021	280.90	250,241,009	70,292,699
Friday, June 4, 2021	279.30	250,241,009	69,892,314
Friday, June 11, 2021	271.49	250,241,009	67,937,932
Friday, June 18, 2021	261.43	250,241,009	65,420,507
Friday, June 25, 2021	265.85	250,241,009	66,526,572
Friday, July 2, 2021	270.91	246,972,217	66,907,243
Friday, July 9, 2021	263.64	246,972,217	65,111,755
Friday, July 16, 2021	260.55	246,972,217	64,348,611
Friday, July 23, 2021	265.32	246,972,217	65,526,669
Friday, July 30, 2021	257.83	246,972,217	63,676,847
Friday, August 6, 2021	256.01	246,972,217	63,227,357
Friday, August 13, 2021	268.92	246,972,217	66,415,769
Friday, August 20, 2021	262.27	246,972,217	64,773,403
Friday, August 27, 2021	260.81	246,972,217	64,412,824
Friday, September 3, 2021	250.40	246,972,217	61,841,843
Friday, September 10, 2021	247.15	246,972,217	61,039,183
Friday, September 17, 2021	246.04	246,972,217	60,765,044
Friday, September 24, 2021	245.07	246,972,217	60,525,481
Friday, October 1, 2021	243.54	243,344,509	59,264,122
Friday, October 8, 2021	264.88	243,344,509	64,457,094
Friday, October 15, 2021	275.58	243,344,509	67,060,880
Friday, October 22, 2021	286.54	243,344,509	69,727,936
Friday, October 29, 2021	293.05	243,344,509	71,312,108
Friday, November 5, 2021	283.90	243,344,509	69,085,506
Friday, November 12, 2021	275.59	243,344,509	67,063,313
Friday, November 19, 2021	273.72	243,344,509	66,608,259
Friday, November 26, 2021	269.65	243,344,509	65,617,847
Friday, December 3, 2021	281.24	243,344,509	68,438,210
Friday, December 10, 2021	289.53	243,344,509	70,455,536
Friday, December 17, 2021	284.79	243,344,509	69,302,083
Thursday, December 23, 2021	287.53	243,344,509	69,968,847
Friday, December 31, 2021	297.71	243,344,509	72,446,094

Note: Capitalization calulated using close of week price multiplied by the number of shares outstanding.

Market Value for Common Equity

UNP Data from Bloomberg 1-10-2022

End of Wk. Date	End of Wk Close	Shares Outstanding	Capitalization ($000)
Friday, January 8, 2021	218.82	673,868,865	147,455,985
Friday, January 15, 2021	216.60	673,868,865	145,959,996
Friday, January 22, 2021	207.13	673,868,865	139,578,458
Friday, January 29, 2021	197.47	669,829,363	132,271,204
Friday, February 5, 2021	204.20	669,829,363	136,779,156
Friday, February 12, 2021	213.16	669,829,363	142,780,827
Friday, February 19, 2021	209.06	669,829,363	140,034,527
Friday, February 26, 2021	205.96	669,829,363	137,958,056
Friday, March 5, 2021	209.71	669,829,363	140,469,916
Friday, March 12, 2021	214.09	669,829,363	143,403,768
Friday, March 19, 2021	210.80	669,829,363	141,200,030
Friday, March 26, 2021	222.92	669,829,363	149,318,362
Thursday, April 1, 2021	220.21	669,829,363	147,503,124
Friday, April 9, 2021	223.24	669,829,363	149,532,707
Friday, April 16, 2021	222.71	664,302,521	147,946,814
Friday, April 23, 2021	223.54	664,302,521	148,498,186
Friday, April 30, 2021	222.09	664,302,521	147,534,947
Friday, May 7, 2021	229.48	664,302,521	152,444,143
Friday, May 14, 2021	227.86	664,302,521	151,367,972
Friday, May 21, 2021	221.52	664,302,521	147,156,294
Friday, May 28, 2021	224.73	664,302,521	149,288,706
Friday, June 4, 2021	226.17	664,302,521	150,245,301
Friday, June 11, 2021	221.33	664,302,521	147,030,077
Friday, June 18, 2021	214.81	664,302,521	142,698,825
Friday, June 25, 2021	221.27	664,302,521	146,990,219
Friday, July 2, 2021	224.72	664,302,521	149,282,063
Friday, July 9, 2021	221.69	664,302,521	147,269,226
Friday, July 16, 2021	218.42	652,122,933	142,436,691
Friday, July 23, 2021	220.15	652,122,933	143,564,864
Friday, July 30, 2021	218.76	652,122,933	142,658,413
Friday, August 6, 2021	220.50	652,122,933	143,793,107
Friday, August 13, 2021	227.80	652,122,933	148,553,604
Friday, August 20, 2021	223.71	652,122,933	145,886,421
Friday, August 27, 2021	221.43	652,122,933	144,399,581
Friday, September 3, 2021	214.91	652,122,933	140,147,740
Friday, September 10, 2021	207.76	652,122,933	135,485,061
Friday, September 17, 2021	201.47	652,122,933	131,383,207
Friday, September 24, 2021	203.80	652,122,933	132,902,654
Friday, October 1, 2021	201.74	652,122,933	131,559,281
Friday, October 8, 2021	216.48	652,122,933	141,171,573
Friday, October 15, 2021	225.16	642,875,700	144,749,893
Friday, October 22, 2021	237.59	642,875,700	152,740,838
Friday, October 29, 2021	241.40	642,875,700	155,190,194
Friday, November 5, 2021	238.83	642,875,700	153,538,003
Friday, November 12, 2021	242.44	642,875,700	155,858,785
Friday, November 19, 2021	241.31	642,875,700	155,132,335
Friday, November 26, 2021	239.79	642,875,700	154,155,164
Friday, December 3, 2021	240.43	642,875,700	154,566,605
Friday, December 10, 2021	248.46	642,875,700	159,728,896
Friday, December 17, 2021	242.69	642,875,700	156,019,504
Thursday, December 23, 2021	245.64	642,875,700	157,915,987
Friday, December 31, 2021	251.93	642,875,700	161,959,675

Note: Capitalization calulated using close of week price multiplied by the number of shares outstanding.

Market Value for Common Equity

Total Market Value for CSX, NSC, and UNP combined

Based on close price on last trading day of week and shares outstanding from 10-K and 10-Q.

	Days For Week (actual trading days)		Capitalization	
	Beginning	End	($000)	Holiday (M or F)
1.	Monday, January 4, 2021	Friday, January 8, 2021	$285,274,529	
2.	Monday, January 11, 2021	Friday, January 15, 2021	$281,650,864	
3.	Tuesday, January 19, 2021	Friday, January 22, 2021	$268,631,558	Martin Luther King Day
4.	Monday, January 25, 2021	Friday, January 29, 2021	$257,952,492	
5.	Monday, February 1, 2021	Friday, February 5, 2021	$266,183,667	
6.	Monday, February 8, 2021	Friday, February 12, 2021	$275,710,270	
7.	Tuesday, February 16, 2021	Friday, February 19, 2021	$275,254,453	Washington's Birthday
8.	Monday, February 22, 2021	Friday, February 26, 2021	$271,262,316	
9.	Monday, March 1, 2021	Friday, March 5, 2021	$274,827,556	
10.	Monday, March 8, 2021	Friday, March 12, 2021	$280,824,569	
11.	Monday, March 15, 2021	Friday, March 19, 2021	$276,025,594	
12.	Monday, March 22, 2021	Friday, March 26, 2021	$292,533,733	
13.	Monday, March 29, 2021	Thursday, April 1, 2021	$289,028,226	Good Friday
14.	Monday, April 5, 2021	Friday, April 9, 2021	$292,165,671	
15.	Monday, April 12, 2021	Friday, April 16, 2021	$290,437,051	
16.	Monday, April 19, 2021	Friday, April 23, 2021	$297,161,686	
17.	Monday, April 26, 2021	Friday, April 30, 2021	$293,720,242	
18.	Monday, May 3, 2021	Friday, May 7, 2021	$303,077,249	
19.	Monday, May 10, 2021	Friday, May 14, 2021	$300,930,424	
20.	Monday, May 17, 2021	Friday, May 21, 2021	$291,002,927	
21.	Monday, May 24, 2021	Friday, May 28, 2021	$295,412,239	
22.	Tuesday, June 1, 2021	Friday, June 4, 2021	$295,589,900	Memorial Day
23.	Monday, June 7, 2021	Friday, June 11, 2021	$288,610,032	
24.	Monday, June 14, 2021	Friday, June 18, 2021	$279,882,926	
25.	Monday, June 21, 2021	Friday, June 25, 2021	$286,159,046	
26.	Monday, June 28, 2021	Friday, July 2, 2021	$289,640,783	
27.	Tuesday, July 6, 2021	Friday, July 9, 2021	$284,141,586	Independence Day
28.	Monday, July 12, 2021	Friday, July 16, 2021	$277,824,468	
29.	Monday, July 19, 2021	Friday, July 23, 2021	$283,061,543	
30.	Monday, July 26, 2021	Friday, July 30, 2021	$279,200,567	
31.	Monday, August 2, 2021	Friday, August 6, 2021	$279,840,682	
32.	Monday, August 9, 2021	Friday, August 13, 2021	$291,329,149	
33.	Monday, August 16, 2021	Friday, August 20, 2021	$286,703,972	
34.	Monday, August 23, 2021	Friday, August 27, 2021	$284,225,293	
35.	Monday, August 30, 2021	Friday, September 3, 2021	$274,133,452	
36.	Tuesday, September 7, 2021	Friday, September 10, 2021	$266,300,892	Labor Day
37.	Monday, September 13, 2021	Friday, September 17, 2021	$260,482,023	
38.	Monday, September 20, 2021	Friday, September 24, 2021	$262,009,901	
39.	Monday, September 27, 2021	Friday, October 1, 2021	$258,117,019	
40.	Monday, October 4, 2021	Friday, October 8, 2021	$278,178,903	
41.	Monday, October 11, 2021	Friday, October 15, 2021	$287,577,086	
42.	Monday, October 18, 2021	Friday, October 22, 2021	$301,029,746	
43.	Monday, October 25, 2021	Friday, October 29, 2021	$306,726,762	
44.	Monday, November 1, 2021	Friday, November 5, 2021	$301,162,302	
45.	Monday, November 8, 2021	Friday, November 12, 2021	$301,061,654	
46.	Monday, November 15, 2021	Friday, November 19, 2021	$301,765,436	
47.	Monday, November 22, 2021	Friday, November 26, 2021	$298,666,681	
48.	Monday, November 29, 2021	Friday, December 3, 2021	$302,497,340	
49.	Monday, December 6, 2021	Friday, December 10, 2021	$311,673,143	
50.	Monday, December 13, 2021	Friday, December 17, 2021	$304,547,954	
51.	Monday, December 20, 2021	Thursday, December 23, 2021	$309,484,443	Christmas Day
52.	Monday, December 27, 2021	Friday, December 31, 2021	$317,801,945	
	Average		**$286,701,806.65**	

Market Value for Common Equity

List of U.S. Stock Market Full-Day Holidays in 2021

	Day	Holiday
1.	Friday, January 1, 2021	New Year's Day
2.	Monday, January 18, 2021	Martin Luther King Jr. Day
3.	Monday, February 15, 2021	Washington's Birthday
4.	Friday, April 2, 2021	Good Friday
5.	Monday, May 31, 2021	Memorial Day
6.	Monday, July 5, 2021	Independence Day
7.	Monday, September 6, 2021	Labor Day
8.	Thursday, November 25, 2021	Thanksgiving Day
9.	Friday, December 24, 2021	Christmas Day

Historical Risk Free Rates and Market Risk Premiums

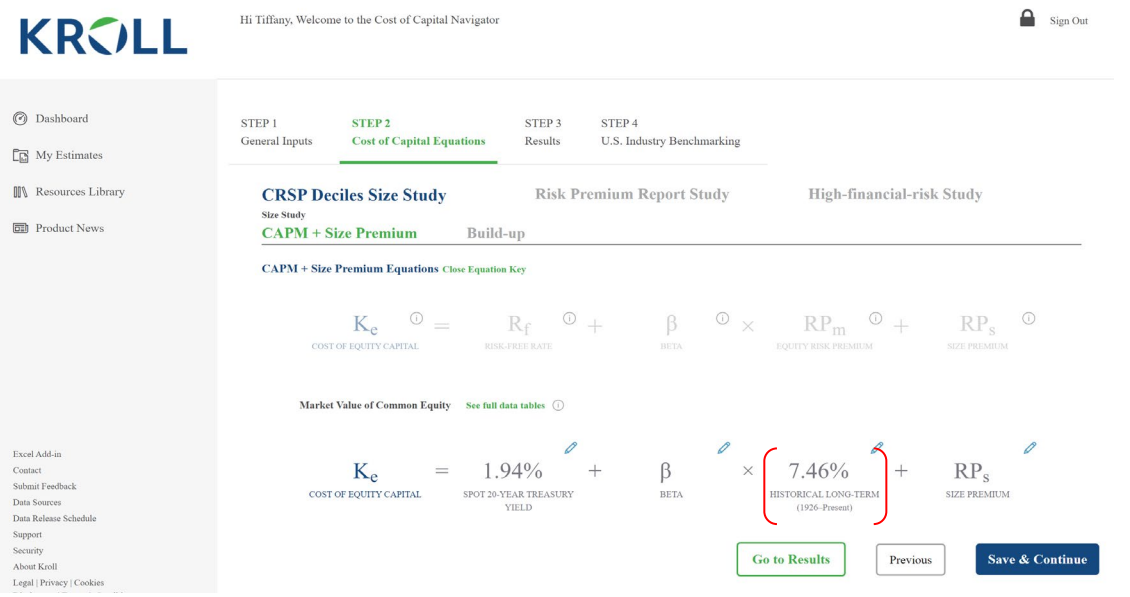
The Surface Transportation Board (STB) has used a Capital Asset Pricing Model (CAPM) as part of its cost of capital determination since 2006. Two major components of the STB's CAPM are the Risk-Free Rate, which is based on 20-Year U.S. Government Bonds, and the Market Risk Premium (a.k.a. Equity Risk Premium), as calculated by Ibbotson Associates using data beginning in 1926. The table below lists the rates used by the STB (since 2006), the rate for the current year, and earlier rates that would have been used as part of the current STB specifications.

Year	Risk-Free Rate	Market Risk Premium
1980	11.36 %	7.60 %
1981	13.72	7.20
1982	12.92	7.20
1983	11.34	7.30
1984	12.49	7.10
1985	10.97	7.30
1986	7.84	7.40
1987	n.a.	7.20
1988	n.a.	7.20
1989	n.a.	7.50
1990	n.a.	7.20
1991	n.a.	7.40
1992	n.a.	7.30
1993	6.29	7.20
1994	7.49	7.00
1995	6.95	7.40
1996	6.83	7.50
1997	6.69	7.80
1998	5.72	8.00
1999	6.20	8.10
2000	6.23	7.80
2001	5.63	7.40
2002	5.43	7.00
2003	4.96	7.20
2004	5.04	7.20
2005	4.64	7.10
2006	5.00	7.13
2007	4.91	7.05
2008	4.36	6.47
2009	4.11	6.67
2010	4.03	6.72
2011	3.62	6.62
2012	2.54	6.70
2013	3.12	6.96
2014	3.07	7.00
2015	2.55	6.90
2016	2.22	6.94
2017	2.65	7.07
2018	3.02	6.91
2019	2.40	7.15
2020	1.35	7.25
2021	1.98	7.46

Sources Federal Reserve Board for U.S. government 20-year bonds (Risk-Free Rate) and Morningstar's *Ibbotson SBBI Valuation Yearbook* Table A-1 for Market Risk Premiums through 2012. Morningstar's *Ibbotson SBBI Classic Yearbook* is the source for premiums beginning 2013. The Duff & Phelps *Valuation Handbook Guide to Cost of Capital* is the source for premiums in 2015 and 2016. Values for 2017-2021 are from the Duff & Phelps online Cost of Capital Navigator. 2006 through 2020 match decisions by the STB. The U.S. Government did not issue 20-Year bonds in 1987 through 1992.

Historical Risk Free Rates and Market Risk Premiums

The Surface Transportation Board (STB) has always used a **long-term** equity risk premium (a.k.a. market risk premium) for its Capital Asset Pricing Model, and Duff & Phelps has been the source used in recent years. Duff & Phelps calculates this premium using the same method as the earlier source used by the STB, Morningstar/Ibbotson as found in its Ibbotson *SBBI Valuation Yearbook*. The screenshot shown below is from the Duff & Phelps 2022 *Cost of Capital Navigator*.The latest long-term equity risk premium, as shown below, is **7.46 percent**. The years used for this calculation are 1926 through 2021.



AAR Regression for 2021 Beta

AAR Regression for 2021 Beta
STB-Style 5-Year Beta using SP 500 Price Index, Weighted RR Returns, 90-Day T-Bill as RF
CSX, NSC, and UNP

The GLM Procedure

Dependent Variable: ZRR

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	0.001277880	0.00136426	0.94	0.3498
ZSP5	1.070363159	0.05442953	19.67	<.0001

Cost of Common Equity using the Multi-Stage Discounted Cash Flow Model

The cost of equity for each firm (r_i) in the Surface Transportation Board's interpretation of the Morningstar/Ibbotson three-stage DCF model is the solution to the following equation:[1]

$$\mathrm{MV}_{i0} = \sum_{t=1}^{5} \frac{\mathrm{CF}_{i0}(1+g_{i1})^t}{(1+r_i)^t} + \sum_{t=6}^{10} \frac{\mathrm{CF}_{i5}(1+g_{i2})}{(1+r_i)^t} + \frac{\left(\dfrac{\mathrm{IBEI}_{i10}(1+g_{i3})}{r_i - g_{i3}}\right)}{(1+r_i)^{10}},$$

where

MV_{i0} = market value of equity for firm i in year 0 (i.e., the year for which the cost of equity is being estimated);

CF_{it} = average cash flow for firm i at the end of year t;

g_{ij} = earnings growth rate for firm i in stage j (j = 1, 2, or 3);

r_i = the cost of equity for firm i; and

$\mathrm{IBEI}_{10} = \mathrm{IBEI}_0(1+g_1)^5(1+g_2)^5$.

Note that IBEI_0 is determined by the same process as CF_0 (See Table 13 in text).

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[1] *Cost of Capital Yearbook*, 2008, Morningstar, Inc., p. 24.

Cash Flow Calculation

CSX, Corp.	1	2	3	4	5	Total
	2017	2018	2019	2020	2021	
($ in millions)						
Revenue	11,408	12,250	11,937	10,583	12,522	58,700
Net Income	1,840	3,309	3,331	2,765	3,781	15,026
Extraordinary Items	0	0	0	0	0	0
Depreciation	1,315	1,331	1,349	1,383	1,420	6,798
Deferred Taxes	209	279	273	180	167	1,108
Capital Expenditures	2,040	1,745	1,657	1,626	1,791	8,859
Cash Flow	1,324	3,174	3,296	2,702	3,577	14,073
Cash Flow / Revenue	0.11606	0.25910	0.27612	0.25532	0.28566	0.23974
NIBEI / Revenue	0.16129	0.27012	0.27905	0.26127	0.30195	0.25598

Ibbotson Smoothed Cash Flow = $12,522 x 0.23974 = $3,002.08
Ibbotson Smoothed Net Income BEI = $12,522 x 0.25598 = $3,205.38

2017 Data	
Net Income as reported to SEC	$5,471
Net Income as requested by STB	1,840
Deferred Taxes as reported to SEC	-3,233
Deferred Taxes as requested by STB	209

Cash Flow Calculation

Norfolk Southern	1	2	3	4	5	Total
	2017	2018	2019	2020	2021	
($ in millions)						
Revenue	10,551	11,458	11,296	9,789	11,142	54,236
Net Income	1,922	2,666	2,722	2,013	3,005	12,328
Extraordinary Items	0	0	0	0	0	0
Depreciation	1,059	1,104	1,139	1,154	1,181	5,637
Deferred Taxes	477	173	330	142	184	1,306
Capital Expenditures	1,723	1,951	2,019	1,494	1,470	8,657
Cash Flow	1,735	1,992	2,172	1,815	2,900	10,614
Cash Flow / Revenue	0.16444	0.17385	0.19228	0.18541	0.26028	0.19570
NIBEI / Revenue	0.18216	0.23268	0.24097	0.20564	0.26970	0.22730

Ibbotson Smoothed Cash Flow = $11,142 x 0.19570 = $2,180.49
Ibbotson Smoothed Net Income BEI = $11,142 x 0.22730 = $2,532.61

2017 Data	
Net Income as reported to SEC	$5,404
Net Income as requested by STB	1,922
Deferred Taxes as reported to SEC	-2,859
Deferred Taxes as requested by STB	477

Cash Flow Calculation

Union Pacific Corp.	1	2	3	4	5	Total
	2017	2018	2019	2020	2021	
($ in millions)						
Revenue	21,240	22,832	21,708	19,533	21,804	107,117
Net Income	4,638	5,966	5,919	5,349	6,523	28,395
Extraordinary Items	0	0	0	0	0	0
Depreciation	2,105	2,191	2,216	2,210	2,208	10,930
Deferred Taxes	868	338	566	340	154	2,266
Capital Expenditures	3,238	3,437	3,453	2,927	2,936	15,991
Cash Flow	4,373	5,058	5,248	4,972	5,949	25,600
Cash Flow / Revenue	0.20589	0.22153	0.24175	0.25454	0.27284	0.23899
NIBEI / Revenue	0.21836	0.26130	0.27266	0.27384	0.29917	0.26508

Ibbotson Smoothed Cash Flow = $21,804 x 0.23899 = $5,210.96
Ibbotson Smoothed Net Income BEI = $21,804 x 0.26508 = $5,779.89

2017 Data	
Net Income as reported to SEC	$10,712
Net Income as requested by STB	4,638
Deferred Taxes as reported to SEC	-5,067
Deferred Taxes as requested by STB	868

2021 Median Growth Rates for MSDCF

	Analyst Growth Rates from IBES December 31								
Company	**Rate 1**	**Rate 2**	**Rate 3**	**Rate 4**	**Rate 5**	**Rate 6**	**Rate 7**	**Rate 8**	**Median**
CSX	14.90	20.05	17.70	--	--	--	--	--	**17.70**
NSC	18.00	18.23	16.90	--	--	--	--	--	**18.00**
UNP	16.99	17.32	15.30	--	--	--	--	--	**16.99**

Simple Average of Medians = 17.56 percent.

2021 Median Growth Rates for MSDCF
CSX

Detail Estimates - Period Summary

Enter RIC : CSX.O **CSX Corp**

Measure : Earnings Per Share

Period : Long Term Growth

Currency: USD *(in millions except for per share items)*

	Ests	Mean	High	Low
Earnings Per Share	3	17.55	20.05	14.90
Filtered/Preliminary Mean**:	1	14.90	14.90	14.90
30 Day Ago Mean	3	17.77	20.71	14.90

	12/2020\	3/2021\	6/2021\	9/2021\	12/2020A
Reported	0.35	0.31	0.39	0.43	1.21
Surprise Mean	0.34	0.32	0.37	0.38	1.20
Surprise (%)	3.44	-1.97	6.13	14.15	0.80

* Only selected brokers below are included in the filtered mean

Check / Uncheck	Contributor	Analyst	Current Estimate	Current Estimate Date	Previous Estimate	Previous Estimate Date	Review Date
✓	Permission Denied 32	Permission Denie	14.90 ↑	Oct 21, 21	12.80	Sep 29, 21	Dec 01, 21
	Permission Denied 392	Permission Denie	20.05 ↓	Dec 13, 21	20.71	Nov 29, 21	Dec 20, 21
	Permission Denied 398136	Permission Denie	17.70 ↑	Oct 20, 21	17.40	Jul 22, 21	Oct 20, 21

2021 Median Growth Rates for MSDCF
NSC

Detail Estimates - Period Summary

Enter RIC : NSC **Norfolk Southern Corp**

Measure : Earnings Per Share

Period : Long Term Growth

Currency: USD *(in millions except for per share items)*

	Ests	Mean	High	Low
Earnings Per Share	3	17.71	18.23	16.90
Filtered/Preliminary Mean**:	1	18.00	18.00	18.00
30 Day Ago Mean	3	17.71	18.23	16.90

	12/2020\	3/2021\	6/2021\	9/2021\	12/2020A
Reported	2.63	2.66	3.28	3.06	9.25
Surprise Mean	2.48	2.54	2.96	2.91	9.18
Surprise (%)	6.10	4.71	10.92	5.20	0.74

* Only selected brokers below are included in the filtered mean

Check / Uncheck	Contributor	Analyst	Current Estimate	Current Estimate Date	Previous Estimate	Previous Estimate Date	Review Date
✓	Permission Denied 32	Permission Denied	18.00 ↑	Oct 28, 21	13.70	Sep 29, 21	Oct 28, 21
	Permission Denied 392	Permission Denied	18.23 ↑	Nov 29, 21	8.00	Oct 08, 88	Dec 22, 21
	Permission Denied 398136	Permission Denied	16.90 ↑	Oct 27, 21	15.10	Apr 28, 21	Oct 27, 21

2021 Median Growth Rates for MSDCF
UNP

Detail Estimates - Period Summary

Enter RIC : UNP **Union Pacific Corp**

Measure : Earnings Per Share

Period : Long Term Growth

Currency: USD *(in millions except for per share items)*

	Ests	Mean	High	Low
Earnings Per Share	3	16.54	17.32	15.30
Filtered/Preliminary Mean**:	1	16.99	16.99	16.99
30 Day Ago Mean	3	16.54	17.32	15.30

	12/2020\	3/2021\	6/2021\	9/2021\	12/2020A
Reported	2.36	2.00	2.72	2.57	8.19
Surprise Mean	2.30	2.06	2.52	2.49	8.12
Surprise (%)	2.82	-2.82	7.86	3.16	0.81

* Only selected brokers below are included in the filtered mean

Check / Uncheck	Contributor	Analyst	Current Estimate	Current Estimate Date	Previous Estimate	Previous Estimate Date	Review Date
✓	CREDIT SUISSE	Wright, Brian	16.99 ↑	Oct 22, 21	16.76	Jul 22, 21	Oct 22, 21
	Permission Denied 392	Permission Denie	17.32 ↑	Nov 29, 21	9.97	Dec 12, 19	Dec 22, 21
	Permission Denied 398136	Permission Denie	15.30 ↑	Oct 21, 21	14.50	Jul 22, 21	Oct 21, 21

Stage 3 Growth Rate for MS-DCF
Summary

The Surface Transportation Board's Multi-Stage Discounted Cash Flow model for estimating the cost of common equity uses 3 stages of growth. The third stage is the long-run nominal growth rate of the U.S. economy, and it is estimated by adding the long-term expected growth in output (represented by the historical growth rate for U.S. Real Gross Domestic Product since 1929) to the long-run expected U.S. inflation rate.

Long Term Expected Growth in Output			3.16 %
Historical Growth Rate for Real GDP, 1929-2021		(page 2)	
Long Term Expected Inflation Rate			2.57
Rate for Long-Term U.S. Government Bonds	1.94	(page 5)	
Rate for 20-year U.S. Inflation-Indexed Bonds	-0.63	(page 5)	
	2.57		
Stage 3 Growth Rate (real growth + inflation)			**5.73 %**

The purpose of this appendix is to replicate Morningstar's Stage 3 Growth Rate used by the Surface Transportation Board in its version of the Multi-Stage Discounted Cash Flow model used to estimate the cost of common equity for the railroad industry.

Morningstar's Ibbotson SBBI Valuation Yearbook has annually been used as a source for the Stage 3 growth rate of the Surface Transportation Board's Multi-Stage Discounted Cash Flow (MSDCF) model. On September 19, 2013, Morningstar customers were notified that the *SBBI Valuation Yearbook* was being discontinued, but much of the same data could be found in a different publication -- the *Ibbotson SBBI Classic Yearbook*.

Customer Service said **"We won't be publishing the long-term growth rate anymore, however it's pretty simple to calculate using data that will be in the Classic Yearbook and publicly available data."** They also said "Essentially, you would take the long-term government yield as of December (which would be included in the Classic Yearbook) and subtract the Treasury Real Yield for 20 year bonds as of the same date. This value is called the inflation estimate." "From there, you need the GDP growth rate, which you can calculate from the Current-dollar and "real" GDP link in the BEA website. Using the GDP in billions of chained 2005 dollars column, calculate an annual growth rate. One thing, however, is that we've always used GDP chained to 2005 dollars and it looks like they've since changed it to be chained to 2009 dollars. This may cause a slight change in the historical growth rates."

Beginning in 2016, Morningstar stopped publishing its Ibbotson SBBI Classic Yearbook. Calculations on page 5 of this appendix use 20-Year U.S. Treasury Bonds in lieu of the Ibbotson Long-Term Government Yields.

Stage 3 Growth Rate for MS-DCF
Long-Term Expected Growth in Output

AAR Replicates Morningstar

Year	(a) GDP in billions of chained 2005 dollars	(b) Years of Growth	(c) AAR Calc. Growth Rate	(d) SBBI Text Growth Rate
1929	976.1			
2009	12,757.9	80	3.27%	3.3%
2010	13,063.0	81	3.25%	3.3%
2011	13,299.1	82	3.24%	3.24%
2012	13,591.1	83	3.22%	3.22%

The Bureau of Economic Analysis rebased Real GDP from 2005 dollars to 2009 dollars, and may have revised recent year data. Therefore, GDP data in 2005 $ were not available for 2013. Beginning in 2019, BEA began using 2012 dollars.

(a) Real GDP in 2005 $ - 2009-2012 are from the Economic Report of the President 2013, Table B-11
1929 is from BEA table dated August 2011
(b) Year minus 1929 = number of years of growth from 1929 to year
(c) Compound growth rate from 1929 to year
(d) Ibbotson SBBI Valuation Yearbook, chapter 4. For 2012 data, 2013 edition, page 52.

AAR Calculates Growth Rate using GDP in 2012 dollars

Year	(e) GDP in billions of chained 2012 dollars	(f) Years of Growth	(g) AAR Calc. Growth Rate	(h) AAR Calc. Growth Rate using 2009 $
1929	1,110.2			
2014	16,932.1	85	3.26%	3.25%
2015	17,390.3	86	3.25%	3.25%
2016	17,680.3	87	3.23%	3.22%
2017	18,079.1	88	3.22%	3.21%
2018	18,606.8	89	3.22%	
2019	19,032.7	90	3.21%	
2020	18,384.7	91	3.13%	
2021	**19,428.4**	**92**	**3.16%**	

(e) Real GDP in 2012 $ downloaded from BEA 2/24/2022.
(f) Year - 1929 = number of years of growth from 1929 to year
(g) Compound growth rate from 1929 to year
(h) Previous years' calculations used 2009 $, which have now been discontinued. This column's purpose is only for comparison purposes.

Stage 3 Growth Rate for MS-DCF
Data Sources for Real GDP in 2005 $

186 GDP and Other Major NIPA Series August 2011

Table 2A. Real Gross Domestic Product—Continues

[Billions of chained (2005) dollars; quarterly estimates are seasonally adjusted at annual rates]

Year and quarter	Gross domestic product	Personal consumption expenditures	Gross private domestic investment	Exports and imports of goods and services		Government consumption expenditures and gross investment	Residual	Final sales of domestic product	Gross domestic purchases	Final sales to domestic purchasers	Gross national product	Percent change from preceding period				
				Exports	Imports							Gross domestic product	Final sales of domestic product	Gross domestic purchases	Final sales to domestic purchasers	Gross national product
1929	976.1	736.3	101.4	37.9	49.1	146.5	3.1	986.8	994.1	1,005.2	984.6	...	...	...	...	...
1930	892.0	696.8	67.6	31.3	42.7	161.4	−22.4	919.2	911.1	939.2	900.0	−8.6	−6.8	−8.4	−6.6	−8.6
1931	834.2	674.9	42.5	26.1	37.2	168.2	−40.3	865.2	853.9	885.9	840.7	−6.5	−5.9	−6.3	−5.7	−6.6
1932	725.2	614.4	12.8	20.4	30.9	162.6	−54.1	766.6	743.9	786.5	730.5	−13.1	−11.4	−12.9	−11.2	−13.1
1933	715.8	600.8	18.9	29.5	32.2	157.2	−49.4	743.2	735.1	763.4	720.3	−1.3	−3.1	−1.2	−2.9	−1.4
1934	793.7	643.7	34.1	22.8	32.9	177.3	−51.3	814.0	812.7	833.7	797.7	10.9	9.5	10.6	9.2	10.7
1935	864.2	683.0	63.1	24.1	43.1	182.2	−45.1	864.5	892.2	892.7	868.9	8.9	6.2	9.8	7.1	8.9
1936	977.0	752.5	80.9	25.3	42.6	219.6	−51.7	978.9	1,006.1	1,008.1	981.1	13.1	13.2	12.8	12.9	12.9
1937	1,027.1	780.4	101.1	31.9	47.9	203.6	−42.0	1,019.8	1,052.9	1,045.5	1,032.5	5.1	4.2	4.7	3.7	5.2
1938	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	−1.4	−4.3	−2.3	−3.4
1939	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.4	8.1	7.4	8.1

TABLE B–2. Real gross domestic product, 1964–2012

[Billions of chained (2005) dollars, except as noted; quarterly data at seasonally adjusted annual rates]

Year or quarter	Gross domestic product	Personal consumption expenditures			Gross private domestic investment				
						Fixed investment			
							Nonresidential		
		Total	Goods	Services	Total	Total	Total	Structures	Equipment and software
1964	3,389.4	2,107.5	...	...	382.1	...	...	...	...
1965	3,607.0	2,240.8	...	...	435.7	...	...	...	...
1966	3,842.1	2,367.9	...	...	474.1	...	...	...	...
1967	3,939.2	2,438.8	...	...	452.4	...	...	...	...
1968	4,129.9	2,579.6	...	...	478.7	...	...	...	...
1969	4,258.2	2,676.2	...	...	506.6	...	...	...	...
1970	4,266.3	2,738.9	...	...	473.4	...	...	...	...
1971	4,409.5	2,843.3	...	...	527.3	...	...	...	...
1972	4,643.8	3,018.1	...	...	589.8	...	...	...	...
1973	4,912.8	3,167.7	...	...	658.9	...	...	...	...
1974	4,885.7	3,141.4	...	...	610.3	...	...	...	...
1975	4,875.4	3,212.6	...	...	502.2	...	...	...	...
1976	5,136.9	3,391.5	...	...	603.7	...	...	...	...
1977	5,373.1	3,534.3	...	...	694.9	...	...	...	...
1978	5,672.8	3,690.1	...	...	778.7	...	...	...	...
1979	5,850.1	3,777.8	...	...	803.5	...	...	...	...
1980	5,834.0	3,764.5	...	...	715.2	...	...	...	...
1981	5,982.1	3,821.6	...	...	779.6	...	...	...	...
1982	5,865.9	3,874.9	...	...	670.3	...	...	...	...
1983	6,130.9	4,096.4	...	...	732.8	...	...	...	...
1984	6,571.5	4,313.6	...	...	948.7	...	...	...	...
1985	6,843.4	4,538.3	...	...	939.8	...	...	...	...
1986	7,080.5	4,722.4	...	...	933.5	...	...	...	...
1987	7,307.0	4,868.0	...	...	962.2	...	...	...	...
1988	7,607.4	5,064.3	...	...	984.9	...	...	...	...
1989	7,879.2	5,207.5	...	...	1,024.4	...	...	...	...
1990	8,027.1	5,313.7	...	...	989.9	...	...	...	...
1991	8,008.3	5,321.7	...	...	909.4	...	...	...	...
1992	8,280.0	5,503.2	...	...	983.1	...	...	...	...
1993	8,516.2	5,698.6	...	...	1,070.9	...	...	...	...
1994	8,863.1	5,916.2	...	...	1,216.4	...	...	...	...
1995	9,086.0	6,076.2	1,896.0	4,208.5	1,254.3	1,231.2	787.9	342.0	489.4
1996	9,425.8	6,288.3	1,980.9	4,331.7	1,365.3	1,341.6	861.5	361.4	541.4
1997	9,845.9	6,520.4	2,075.3	4,465.3	1,535.2	1,465.4	965.5	387.9	615.9
1998	10,274.7	6,862.3	2,215.5	4,662.1	1,688.9	1,624.4	1,081.4	407.7	705.2
1999	10,770.7	7,237.6	2,392.0	4,853.1	1,837.6	1,775.5	1,194.3	408.2	805.0
2000	11,216.4	7,604.6	2,518.2	5,093.6	1,963.1	1,906.8	1,311.3	440.0	889.2
2001	11,337.5	7,810.3	2,597.3	5,219.1	1,825.2	1,870.7	1,274.8	433.3	860.6
2002	11,543.1	8,018.3	2,702.9	5,318.5	1,800.4	1,791.5	1,173.7	356.6	824.2
2003	11,836.4	8,244.5	2,827.2	5,418.2	1,870.1	1,854.7	1,189.6	343.0	850.0
2004	12,246.9	8,515.8	2,953.3	5,562.7	2,058.2	1,992.5	1,263.0	346.7	917.3
2005	12,623.0	8,803.5	3,076.7	5,726.8	2,172.3	2,122.3	1,347.3	351.8	995.6
2006	12,958.5	9,054.5	3,178.9	5,875.6	2,231.8	2,172.7	1,455.5	384.0	1,071.1
2007	13,206.4	9,262.9	3,273.5	5,990.2	2,159.5	2,130.6	1,550.0	438.2	1,106.8
2008	13,161.9	9,211.7	3,192.9	6,017.0	1,939.8	1,978.6	1,537.6	466.4	1,059.4
2009	12,757.9	9,032.6	3,098.2	5,930.6	1,458.1	1,602.2	1,259.8	368.1	885.2
2010	13,063.0	9,196.2	3,209.1	5,987.6	1,658.0	1,598.7	1,268.5	310.6	963.9
2011	13,299.1	9,428.8	3,331.0	6,101.5	1,744.0	1,704.5	1,378.2	319.2	1,070.0
2012 p	13,591.1	9,604.9	3,433.0	6,178.0	1,911.0	1,850.1	1,484.9	351.3	1,143.5

"Survey of Current Business", August 2011, U.S. Bureau of Economic Analysis

"Economic Report of the President", March 2013

Stage 3 Growth Rate for MS-DCF
Data Sources for Real GDP in 2012 $

Current-Dollar and "Real" Gross Domestic Product 24-Feb-22

Annual			Quarterly (Seasonally adjusted annual rates)		
	GDP in billions of current dollars	GDP in billions of chained 2012 dollars		GDP in billions of current dollars	GDP in billions of chained 2012 dollars
1929	104.6	1,110.2	1947Q1	243.2	2,034.5
1930	92.2	1,015.8	1947Q2	246.0	2,029.0
1931	77.4	950.7	1947Q3	249.6	2,024.8
1932	59.5	828.1	1947Q4	259.7	2,056.5
2014	17,550.7	16,932.1	1968Q2	934.3	4,791.8
2015	18,206.0	17,390.3	1968Q3	950.8	4,828.9
2016	18,695.1	17,680.3	1968Q4	968.0	4,847.9
2017	19,479.6	18,079.1	1969Q1	993.3	4,923.8
2018	20,527.2	18,606.8	1969Q2	1,009.0	4,938.7
2019	21,372.6	19,032.7	1969Q3	1,030.0	4,971.3
2020	20,893.7	18,384.7	1969Q4	1,038.1	4,947.1
2021	22,997.5	19,428.4	1970Q1	1,051.2	4,939.8

Download for Bureau of Economic Analysis web site. Middle years and some quarters omitted to enable data to fit on this page. Use the 2012 dollars column (annual), circled values.

Stage 3 Growth Rate for MS-DCF
Long-Term Inflation Rate

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
	Long-Term Gov. Yields			Inflation Indexed		Long Term	
	From SBBI		T-Bonds	20-Yr T-Bonds		Inflation Rate	
Year	Text	Appendix	20-Yr	SBBI Text	Daily	SBBI Text	AAR Calc
2009	4.6 %	4.58 %	4.58 %	2.0 %	2.03 %	2.6 %	2.55 %
2010	4.1	4.14	4.13	1.6	1.59	2.6	2.55
2011	2.48	2.48	2.57	0.53	0.53	1.95	1.95
2012	2.41	2.41	2.54	0.15	0.15	2.26	2.26
2013	n/a	3.67	3.72	n/a	1.36	n/a	2.31
2014	n/a	2.40	2.47	n/a	0.68	n/a	1.72
2015	n/a	n/a	2.67	n/a	1.07	n/a	1.60
2016	n/a	n/a	2.79	n/a	0.82	n/a	1.97
2017	n/a	n/a	2.58	n/a	0.61	n/a	1.97
2018	n/a	n/a	2.87	n/a	1.09	n/a	1.78
2019	n/a	n/a	2.25	n/a	0.39	n/a	1.86
2020	n/a	n/a	1.45	n/a	-0.61	n/a	2.06
2021	n/a	n/a	1.94	n/a	-0.63	n/a	2.57

n/a = no longer available

Sources:

(a) Ibbotson SBBI Valuation Yearbook, chapter 4. For 2012 data, 2013 edition, page 52.

(b) SBBI Appendix B, Table B-9 (Long-Term Government Bonds), December
Beginning in 2014, data from Ibbotson® SBBI® Classic Yearbook (Classic Yearbook).
2013 is from Table 2-2 of the Classic Yearbook, on page 42. The 2013 and 2014 numbers are also found in the Ibbotson SBBI Market Report with data as of December, in Table 3 on page 9.

(c) Treasury Constant Maturities, Nominal, 20-Year, Business Day, last day of year
https://www.federalreserve.gov/datadownload/Choose.aspx?rel=H15 (See workpapers)

(d) Ibbotson SBBI Valuation Yearbook, chapter 4. For 2012 data, 2013 edition, page 52.

(e) Treasury Constant Maturities, Inflation Indexed, 20-Year, Business Day,
last (business) day of year
https://www.federalreserve.gov/datadownload/Choose.aspx?rel=H15 (See workpapers)

(f) Ibbotson SBBI Valuation Yearbook, chapter 4. For 2012 data, 2013 edition, page 52.

(g) Column (b) less column (e) except for 2015 to 2021, which is column (c) less column (e)

List of Stage 3 Growth Rates for MS-DCF

The Surface Transportation Board's Multi-Stage Discounted Cash Flow model for estimating the cost of common equity uses 3 stages of growth. The third stage is the long-run nominal growth rate of the U.S. economy, and it is estimated by adding the long-term expected real growth in output (represented by the historical growth rate for U.S. Real Gross Domestic Product since 1929) to the long-run expected U.S. inflation rate. Listed below are the rates used by the Board since it began using the MSDCF in the 2008 Cost of Capital determination, plus the numbers calculated for 2021.

	Long-Term Expected		Stage 3
Year	Real Growth in Output	Inflation Rate	Growth Rate
2008	3.3 %	0.6 %	3.90 %
2009	3.3	2.6	5.80
2010	3.3	2.6	5.80
2011	3.24	1.95	5.19
2012	3.22	2.26	5.48
2013	3.27	2.31	5.58
2014	3.26	1.72	4.98
2015	3.24	1.60	4.84
2016	3.22	1.97	5.19
2017	3.21	1.97	5.18
2018	3.22	1.78	5.00
2019	3.21	1.86	5.07
2020	3.14 %	2.06 %	5.20
2021	3.16 %	2.57 %	5.73 %

Notes:
The Stage 3 Growth Rate for years 2008 through 2012 are from the Ibbotson SBBI Valuation Yearbooks for those years. Ibbotson displayed 1 digit after the decimal for years 2008 through 2010 for the long-term expected growth rate in output and inflation rate. Figures for 2009 and 2010 rounded to the same numbers.

Market Value Data for MSDCF
Stock Price for CSX - End of 2021

CSX Corporation (CSX)
NasdaqGS - NasdaqGS Real Time Price. Currency in USD

Add to watchlist Vis

34.19 -0.24 (-0.71%)
As of 12:23PM EST. Market open.

Summary Company Outlook Chart Conversations Statistics **Historical Data**

Time Period: Dec 26, 2020 - Jan 06, 2022 Show: Historical Prices Frequ

Currency in USD

Date	Open	High	Low	Close*
Jan 06, 2022	37.48	37.87	37.27	37.71
Jan 05, 2022	37.71	37.92	37.40	37.44
Jan 04, 2022	37.11	38.01	37.08	37.63
Jan 03, 2022	37.46	37.74	36.85	37.08
Dec 31, 2021	37.26	37.82	37.16	37.60
Dec 30, 2021	37.41	37.67	37.20	37.32
Dec 29, 2021	37.42	37.76	37.32	37.58
Dec 28, 2021	37.16	37.60	37.16	37.42

Retrieved January 31, 2022.
Link to web page: http://finance.yahoo.com/quote/CSX/history

Market Value Data for MSDCF
Stock Price for NSC - End of 2021

Norfolk Southern Corporation (NSC)
NYSE - Nasdaq Real Time Price. Currency in USD

Add to watchlist

271.40 -0.59 (-0.22%)
As of 12:27PM EST. Market open.

Summary | Company Outlook | Chart | Conversations | Statistics | **Historical Data** | Prof

Time Period: Jan 30, 2021 - Jan 06, 2022 Show: Historical Prices Frequency: Da

Currency in USD

Date	Open	High	Low	Close*
Jan 06, 2022	296.65	298.25	293.63	296.64
Jan 05, 2022	295.98	298.56	293.98	294.71
Jan 04, 2022	290.34	297.58	290.21	294.72
Jan 03, 2022	298.50	298.99	289.37	292.35
Dec 31, 2021	294.40	299.20	293.32	297.71
Dec 30, 2021	296.14	296.87	293.76	294.73
Dec 29, 2021	293.33	296.64	292.75	295.75
Dec 28, 2021	291.17	295.00	291.17	293.29
Dec 27, 2021	288.62	292.00	287.79	291.53

Retrieved January 31, 2022.
Link to web page: http://finance.yahoo.com/quote/NSC/history

Market Value Data for MSDCF
Stock Price for UNP - End of 2021

Union Pacific Corporation (UNP)
NYSE - Nasdaq Real Time Price. Currency in USD

Add to watchlist Visito

244.35 -1.58 (-0.64%)
As of 12:30PM EST. Market open.

Summary Company Outlook Chart Conversations Statistics **Historical Data** F

Time Period: Jan 30, 2021 - Jan 06, 2022 Show: Historical Prices Frequency:

Currency in USD

Date	Open	High	Low	Close*
Jan 06, 2022	254.00	254.70	251.88	253.49
Jan 05, 2022	252.85	254.71	251.66	252.79
Jan 04, 2022	250.00	254.40	249.36	252.03
Jan 03, 2022	253.25	253.50	246.50	247.77
Dec 31, 2021	249.54	253.33	249.14	251.93
Dec 30, 2021	251.27	251.66	248.58	249.54
Dec 29, 2021	250.01	251.77	249.44	251.03
Dec 28, 2021	247.86	250.33	247.34	249.23

Retrieved January 31, 2022.
Link to web page: http://finance.yahoo.com/quote/UNP/history

Market Value Data for MSDCF
Shares Outstanding for CSX - End of 2021

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-Q

(☒) QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the quarterly period ended September 30, 2021

OR

(☐) TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____

Commission File Number 1-8022

CSX CORPORATION

(Exact name of registrant as specified in its charter)

Virginia					**62-1051971**	
					(I.R.S. Employer Identification No.)	
500 Water Street	**15th Floor**	**Jacksonville**	**FL**	**32202**	**904**	**359-3200**
(Address of principal executive offices)				*(Zip Code)*	*(Telephone number, including area code)*	

No Change

(Former name, former address and former fiscal year, if changed since last report.)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of exchange on which registered
Common Stock, $1 Par Value	CSX	Nasdaq Global Select Market

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes (X) No ( )

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).

Yes (X) No ( )

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company (as defined in Exchange Act Rule 12b-2).

Large Accelerated Filer (X) Accelerated Filer ( ) Non-accelerated Filer ( ) Smaller Reporting Company (☐) Emerging growth company (☐)

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ( )

Indicate by a check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act).

Yes (☐) No (X)

There were 2,217,983,411 shares of common stock outstanding on September 30, 2021 (the latest practicable date that is closest to the filing date).

Market Value Data for MSDCF
Shares Outstanding for NSC - End of 2021

UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-Q

☒ QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the quarterly period ended **SEPTEMBER 30, 2021**

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to_____

Commission File Number: 1-8339

NORFOLK SOUTHERN®

NORFOLK SOUTHERN CORPORATION
(Exact name of registrant as specified in its charter)

Virginia — (State or other jurisdiction of incorporation or organization)
52-1188014 — (I.R.S. Employer Identification No.)

650 West Peachtree Street NW
Atlanta, Georgia — (Address of principal executive offices)
30308-1925 — (Zip Code)

(855) 667-3655
(Registrant's telephone number, including area code)

Three Commercial Place, Norfolk, Virginia 23510-2191
(Former name, former address and former fiscal year, if changed since last report)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol	Name of each exchange on which registered
Norfolk Southern Corporation Common Stock (Par Value $1.00)	**NSC**	**New York Stock Exchange**

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.
Large accelerated filer ☒ Accelerated filer ☐ Non-accelerated filer ☐ Smaller reporting company ☐ Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

Indicate the number of shares outstanding of each of the issuer's classes of common stock, as of the latest practicable date.

Class	Outstanding at September 30, 2021
Common Stock ($1.00 par value per share)	243,344,509 (excluding 20,320,777 shares held by the registrant's consolidated subsidiaries)

Market Value Data for MSDCF
Shares Outstanding for UNP - End of 2021

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-Q

(Mark One)
☒ QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the quarterly period ended September 30, 2021
OR
☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____

Commission File Number 1-6075

UNION PACIFIC CORPORATION
(Exact name of registrant as specified in its charter)

Utah	**13-2626465**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

1400 Douglas Street, Omaha, Nebraska
(Address of principal executive offices)

68179
(Zip Code)

(402) 544-5000
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each Class	Trading Symbol	Name of each exchange on which registered
Common Stock (Par Value $2.50 per share)	UNP	New York Stock Exchange

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

☒ Yes ☐ No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).

☒ Yes ☐ No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large Accelerated Filer	☑	Accelerated Filer	☐	Non-Accelerated Filer	☐
Smaller Reporting Company	☐	Emerging Growth Company	☐		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act).

☐ Yes ☒ No

As of October 15, 2021, there were 642,875,700 shares of the Registrant's Common Stock outstanding.

2021 Cost of Equity Using STB's MSDCF

Company	CSX		NSC		UNP	
Year	2021		2021		2021	
Inputs						
Initial Cash Flow	$3,002.08		$2,180.49		$5,210.96	
Input for Terminal C.F.	$3,205.38		$2,532.61		$5,779.89	
Stage One Growth	17.700%		18.000%		16.990%	
Stage Two Growth	17.560%		17.560%		17.560%	
Stage Three Growth*	5.730%		5.730%		5.730%	
Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
1	$3,533	$3,081	$2,573	$2,259	$6,096	$5,354
2	4,159	3,162	3,036	2,341	7,132	5,501
3	4,895	3,245	3,583	2,426	8,344	5,651
4	5,761	3,330	4,227	2,513	9,761	5,806
5	6,781	3,418	4,988	2,604	11,420	5,965
6	7,972	3,503	5,864	2,688	13,425	6,159
7	9,372	3,591	6,894	2,775	15,783	6,358
8	11,018	3,681	8,105	2,864	18,554	6,565
9	12,952	3,773	9,528	2,957	21,812	6,777
10	15,227	3,868	11,201	3,052	25,642	6,997
Terminal	191,902	48,745	168,688	45,967	369,497	100,826
Sum of Pres. Values		$83,396.18		$72,446.09		$161,959.68
Market Value (input)		$83,396.18		$72,446.09		$161,959.68
Cost of Equity	**14.69%**		**13.88%**		**13.87%**	
Prev. Yr. Cost of Equity	9.41%		9.33%		9.68%	

Preferred Stock

There is no preferred stock for any participating railroads

Cost of Preferred Equity Capital

Step 1: Calculate Average Stock Price and Annual Dividend

	Stock Price			
	High	**Low**	**Avg.**	**Dividend**
Q1			$0.000	
Q2			$0.000	
Q3			$0.000	
Q4			$0.000	
Year			**$0.000**	**$0.00**

Step 2: Calculate Cost of Preferred Equity Capital Using Dividend Yield method

	Annual Dividend	**Average Price**	**Yield**
	$0.00	$0.000	#DIV/0!
Cost of Preferred Equity			**#DIV/0!**
Previous Year Cost of Preferred Equity			3.42%

Market Value of Preferred Equity

Outstanding Shares	**Average Price**	**Market Value**
	$0.000	**$0**

Sources: Kansas City Southern Form 10-K for 2021, Balance Sheet
Yahoo Finance (stock prices)