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BEFORE THE
SURFACE TRANSPORTATION BOARD

RAILROAD COST OF CAPITAL — 2022	)	STB Docket No. EP 558 (Sub-No. 26)

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS AND ITS MEMBER RAILROADS

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April 11, 2023

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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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COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS AND ITS MEMBER RAILROADS

By a decision served on February 7, 2023, the Surface Transportation Board ("STB" or "Board") instituted this proceeding to determine the railroad industry's cost of capital for the year 2022. The Board noted that this determination will enable it to make the required annual individual railroad revenue adequacy determination for 2022. 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 – 2022*, EP 558 (Sub-No. 26) (STB served Feb. 7, 2023) ("*Cost of Capital – 2022*").

The railroads, through the Association of American Railroads ("AAR"), are submitting their calculation of: (1) the railroads' 2022 cost of common equity capital; (2) the railroads' 2022 current cost of preferred equity capital; (3) the railroads' current 2022 cost of debt capital; and (4) the 2022 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 2022 cost of common equity capital is 11.99 percent.
2. The 2022 cost of preferred equity capital is 0.00 percent.
3. The 2022 cost of debt capital is 4.28 percent.
4. The capital structure of the railroad industry is 18.29 percent debt, 0.00 percent preferred equity,[1] and 81.71 percent common equity.

From these data, Mr. Gray concludes that the overall railroad industry cost of capital for 2022 is 10.58 percent.[2]

I. Introduction

The sole purpose of this proceeding is to determine the railroad industry's cost of capital for 2022. 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

[1] There is no preferred equity in 2022.

[2] Gray V.S. at 2, 53.

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 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 (2022).[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 the same companies included in the 2021 sample.

II. The Cost of Common Equity Capital

In its February 7, 2023 order instituting this proceeding, the Board directed that the cost of capital components be calculated "using the methodology followed in Railroad Cost of Capital – 2021." *See Cost of Capital – 2022*, slip op. at 2. In *Railroad Cost of Capital – 2021*, 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") 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).[4] *See*

[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] 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.

Railroad Cost of Capital – 2021, EP 558 (Sub-No. 25), slip op. at 7-11 (STB served Aug. 2, 2022).[5] 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. The CAPM Methodology

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.

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 2021 cost

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).

[5] 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).

of capital proceeding. *Railroad Cost of Capital – 2021,* EP 558 (Sub-No. 25), 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.[6] 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.[7] Gray V.S. at 30-31. 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 2022 calculation, the same source was used (the Duff & Phelps *Valuation Handbook – U.S. Guide to Cost of Capital*), but it was obtained through the 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, 2020, and 2021 cost of capital proceedings. Gray V.S. at 32-36.

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

[7] 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)."

The values determined by Mr. Gray for the elements of the CAPM methodology were 3.30 percent for the risk-free rate, 7.17 percent for the market risk premium, and 0.9946 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 2022 is 10.43 percent. Gray V.S. at 37.

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 30, 2022, and stock market values were based on shares outstanding and stock prices as of the last trading day of the last full week for 2022 – December 30, 2022 (Friday). Gray V.S. at 41-47.[8]

Mr. Gray calculates the cost of common equity capital for 2022, using STB's version of the Morningstar/Ibbotson MSDCF model, as 13.54 percent. Gray V.S. at 48-50.

[8] 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' 2018-2022 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 39-41.

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 11.99 percent for 2022. Gray V.S. at 50-51.

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 2002 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, as was the case last year, 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 2022. Gray V.S. at 51.

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 – 2021*, EP 558 (Sub-No. 25), slip op. at 4. To determine the cost of debt for bonds,[9] Mr. Gray has computed the average current bond yield for 132 bonds from the sample railroads for which data were available during 2022 according to the Board's well-established methodology. Under this approach, the bond yield is based on a sample representing 99.1 percent of the book value of the bonds issued by the railroads in the sample.[10] 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.[11] 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

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

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

[11] Gray V.S. at 18-19. No CSAs were modeled because none are outstanding.

cost.[12] Using the Board's established methodology, the railroads' 2022 cost of new debt is 4.28 percent. Gray V.S. at 24.

V. The 2022 Capital Structure of the Railroad Industry and the Overall Cost of Capital

Pursuant to the Board's February 7, 2023 decision, the market values of debt, preferred equity, and common equity were compiled to compute the 2022 capital structure of the railroad industry. The railroads' market value capital structure on a market value basis is 18.29 percent debt, 81.71 percent common equity capital, and 0.00 percent preferred equity capital. Gray V.S. at 52. Based upon this capital structure, the overall 2022 cost of capital is 10.58 percent. Gray V.S. at 53.

Conclusion

The Board should determine that the railroads' cost of capital for 2022 is 10.58 percent.

Respectfully submitted,

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Amber McDonald
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April 11, 2023

[12] 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 2022. This is the same methodology approved by the Board in *Railroad Cost of Capital –2021,* EP 558 (Sub-No. 25), slip op. at 6. Gray V.S. at 19-23.

CERTIFICATE OF SERVICE

I hereby certify that on this 11th day of April 2023, I caused to be served by electronic mail a copy of the foregoing on the following:

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

J. Frederick Miller Jr.

BEFORE THE

SURFACE TRANSPORTATION BOARD

EX PARTE NO. 558 (Sub-No. 26)

RAILROAD COST OF CAPITAL — 2022

VERIFIED STATEMENT

OF

JOHN T. GRAY

SENIOR VICE PRESIDENT — POLICY AND ECONOMICS

ASSOCIATION OF AMERICAN RAILROADS

April 11, 2023

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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 7, 2023 (served February 7), instituting a proceeding to determine the railroad industry's 2022 cost of capital — Ex Parte No. 558 (Sub-No. 26), *Railroad Cost of Capital — 2022* ("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. 25); 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. 25). In addition, I calculate a cost of preferred equity using the dividend yield method, as used in Ex Parte No. 558 (Sub-No. 25). 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 2022 cost of capital for the railroad industry is 10.58 percent. This estimate is based on a current cost of debt of 4.28 percent, a cost of common equity capital of 11.99 percent; a cost of preferred equity of 0.00 percent; and market value weights for debt, common equity, and preferred equity of 18.29 percent, 81.71 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. 26 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 (2022).

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
2022

Class I Railroad	Parent	Stock Symbol	Dividends Throughout 2022	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 2022, 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 2022, the three-firm composite accounts for 61 percent of the operating revenues and 60 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 2022 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

[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 2022, BNSF accounted for 9.6 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 and used in the 2021 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 and also used in the 2021 Cost of Capital Decision. The cost of preferred equity capital would have been calculated using a simple dividend yield method, as also used in the 2021 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 2022. 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 2022

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 debt 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 2022, 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 132 unique CUSIPs (bond identifiers).[9] The 132 bonds represent 99 percent of the book value of all railroad bonds belonging to the composite railroad. 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 132 bonds with market data in 2022, 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, 2022.[10] 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

[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] 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.

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 99.1 percent of the book value of bonds is priced at market. Table 2 summarizes the results of the market value calculations for 2022. The market value for bonds, notes, and debentures that traded is $59.89 billion, which is 99 percent of the total market value of $60.48 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	$16,679,113	$591,679	$17,270,792	27.85 %
NSC	$14,382,099	$0	14,382,099	24.01
UNP	$28,828,193	$0	28,828,193	48.14
Total	$59,889,405	$591,679	$60,481,084	100.00 %
Prior Year	$60,899,233	$441,679	$61,340,912	
Change	-1.7%	34.0%	-1.4%	

Although the number of bond offerings increased in 2022, the total market value for bonds is down 1.4 percent from the previous year. Among the causes of this decrease are existing debt offerings declining in market value, as average yields increase.

Appendix A lists details for each of the 132 bonds, notes, and debentures belonging to the composite railroad that have trading data available for 2022 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. 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 4.220 percent, which is 1.635 percentage points higher than 2021's figure of 2.585 percent.

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

Railroad Co.	Weight	Current Cost
CSX	27.85 %	4.273 %
NSC	24.01	4.319
UNP	48.14	4.140
Total	100.00 %	4.220 %

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 132 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 4.220 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.[11] For 2022, this percentage is 1.32 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.

[11] 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 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 2022 relationships between yields and maturities. After determining the yields to maturity for government bonds of maturities similar 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, 2021, and 2022 the 70 basis point spread is our most recent calculation, and I have used that difference for 2022. For comparisons, Table 4 lists historical spreads used since 2001 and the spread proposed for 2022.[12] 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.

[12] 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	Ex Parte No. 558 (Sub-No. 25)	70
2022	Proposed for EP 558 (Sub-No. 26)	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 2022 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.[13]

Table No. 5
Summary of Equipment Trust Certificates Modeled for 2022
($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	843,617	806,109	824,863	3.742%	806,974	30,195	4
Total	$843,617	$806,109	$824,863	3.742%	$806,974	$30,195	4

Weighing railroad yield (there was only one railroad) by its current market value for modeled ETCs results in a current cost of 3.742 percent. The average rate is higher than the 1.692 percent found for 2021. In this year's case, the premium used in the model is the same as last year – so the higher yield curve for 2022 reflects the higher interest rates on government securities. (See Appendix B). Appendix C lists each ETC, and includes a market value and a

[13] 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 $806.97 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 2022 – 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.[14] 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 2022 is $242.4 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. However, miscellaneous debt is valued at negative $1,083.02 million because in 2022 it consists mostly of discounts and unamortized debt issuance costs.

Capital leases and miscellaneous debt, when combined, net to negative $840.6 million and there were zero non-modeled ETCs. Therefore, All Other Debt as a percent of the total market value of debt of the composite railroad is negative 1.39 percent.

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

Miscellaneous debt is lower than it was for 2021, and much of the decrease 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.[15]

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 $60,447 million.

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

Type of Debt	Market Value	Percent of Total	Percent of Subtotal
Bonds, Notes & Debentures	$60,481,084	100.06 %	98.68 %
Equipment Trust Certificates	806,974	1.34	1.32
Conditional Sales Agreements	0	0.00	0.00
Subtotal	61,288,058	101.39	100.00 %
All Other Debt*	-840,604	-1.39	
Total	$60,447,454	100.00 %	

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

Bonds, Notes, and Debentures (Bonds) account for 100.1 percent of the total market value. More details can be found in Appendix D. As can be computed from that appendix, 99 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.

[15] 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 2022, 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 2022 flotation costs for bonds using publicly available data from electronic filings with the Securities and Exchange Commission (SEC).[16] 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

[16] 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 2022, 13 new issues were reported in five filings, with some filings reporting multiple new issues. A simple average of the 13 flotation costs is 0.064 points, which is .004 higher than the figure used by the Board for 2021. 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 13 new railroad debt issues, which were issued by all three railroads, provide the best information to determine flotation costs for 2022, and I have therefore used 0.064 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.[17] 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)	3.742%
Assumed Duration of New Instrument (Yrs)	15
Calculated	
Price After Flotation Costs	$99.11
Effective Yield Including Flotation Costs	3.820%
Difference Between Yields With and Without Floatation Costs =	
Flotation Cost as Percentage Points	**0.078%**

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 current yields and new issues are on *different places in the yield curve*). Coupons are assumed

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

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 0.078 percentage points – which is .010 percentage points higher than the value for 2021.

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 0.064 percentage points.

Table No. 8
Flotation Costs For Debt

Type of Debt	Market Weight	Flotation Cost
Bonds, Notes & Debentures	98.68%	0.064%
Equipment Trust Certificates	1.32%	0.078%
Conditional Sales Agreements	0.00%	not calculated
Total	100.00%	0.064%

This flotation cost for 2021 is 0.004 percentage points higher than the number used by the Board in its 2021 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	98.68%	4.220%
Equipment Trust Certificates	1.32%	3.742%
Conditional Sales Agreements	0.00%	--
Subtotal	100.00%	4.214%
Flotation Costs		0.064%
Weighted Cost of Debt		4.278%
Weighted Cost of Debt (Rounded)		**4.28%**

The current weighted cost of debt before flotation costs is 4.214 percent. The addition of flotation costs results in a rounded cost of debt of 4.28 percent. This cost of debt is higher than the 2021 of 2.63 percent.[18] A summary for the 2022 calculation of the overall cost of debt is provided in Appendix F. That appendix also has some historical costs of debt for comparisons.

[18] 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 2022

A. The Market Value of Common Equity Capital

The market value of common equity is based on stock prices and shares outstanding for 2022. 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 2022

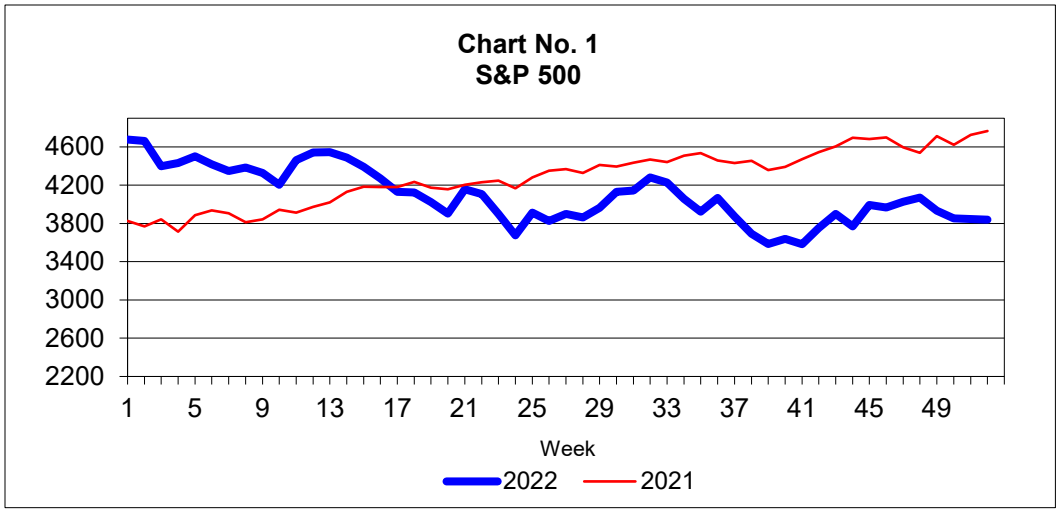
Railroad Co.	Value ($000)	Weight %
CSX	69,423,445.2	25.70
NSC	58,913,410.1	21.81
UNP	141,754,127.7	52.49
Total	$270,090,983.0	100.00 %
Prior Year	$286,701,807.0	
Change	-5.8%	

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 2022.[19] Note that the week beginning on April 11 ends on Thursday April 14 because of the Good Friday holiday. Thus, any railroad shares outstanding change effective on April 15 would not happen until the following week because the market was closed on April 15. Page 5 of Appendix G lists all full-day stock market holidays. Page 4 of the appendix lists the holiday that caused any week to not begin trading on

[19] 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.

a Monday or end trading on a Friday. Calculations for 2022 included 52 weeks. Week 1 began on Monday January 3, 2022, and is the first week after 2021's week 52 used in last year's calculation. The week beginning Tuesday December 27, 2022, qualifies as the final week for 2022. Thus, 2022 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 4 of Appendix G, is $270.1 billion. This is a 5.8 percent decrease 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 lower in 2022 than it was in 2021.

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. 26). 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 historically regarded a particular firm or group of firms. As such, it is unlikely to fully reflect the impact of more current operational, financial, political or economic trends and events on market valuations or risk perceptions. 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 2021 Cost of Capital decision.[20]

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 2022.[21] 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

[20] *Railroad Cost of Capital – 2021,* EP 558 (Sub-No. 25) (STB served August 2, 2022).

[21] 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 2022 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.[22]

Table No. 11
20-Year U.S. Treasury Bonds 2013 - 2022

Year	Average Annual Rate
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
2022	3.30

Source: Federal Reserve

Using the average yield to maturity in 2022 for a 20-year U.S. Treasury Bond, as directed in STB Ex Parte No. 558 (Sub No. 26), the CAPM's risk-free rate is 3.30 percent.

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 &

[22] 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.

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.[23] 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.[24] The Duff & Phelps *Valuation Handbook-U.S. Guide to Cost of Capital* was 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

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

[24] 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 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)."

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*.[25] 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 2022, the online Duff & Phelps *Cost of Capital Navigator* shows this premium as 7.17 percent (note that Duff & Phelps is now a Kroll company). This is a small decrease from the 7.46 percent figure used by the Board for 2021. (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 2022 equity risk premium.) Thus, I used 7.17 percent as the rate for the CAPM's market risk premium.

[25] 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;[26]
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

[26] 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 2022.

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 2017 (Week 0) through the last week of 2022 (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.[27] Week 1 in the regression data set is the week ending Friday, January 5, 2018 (or beginning Tuesday January 2, 2018).[28] 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 2018. The last week of 2022, Week 261, began on Tuesday, December 26. Week 0 began in 2017 on Tuesday 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

[27] In some cases, stock did not trade on Friday. For example, trading during Week 224 ended Thursday, April 14, 2022, because Friday, April 15, 2022, 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 18, because of the Martin Luther King Day holiday on January 17.

[28] Following the Board's clarification in Ex Parte No. 558 (Sub-No. 12), the week beginning January 2, 2018, is the first week in the relevant year that contains 3 or more trading days. The previous week had no trading days in 2018.

(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.[29]

Three categories of data are necessary for the raw regression data set. First, weekly stock prices for CSX, NSC, and UNP are acquired.[30] 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.[31]

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.[32] 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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[29] EP 558 (Sub-No. 12), (STB served Sept. 25, 2009).

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

[31] 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 March 14, 2023, and the range of data was from 12/20/2017 through 1/7/2023.

[32] 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.[33] 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.[34] 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

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

[34] 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 0.994578779824077 using a spreadsheet, and 0.9945754994 using SAS – both round to .9946.[35]

The 2022 beta is lower than the beta for 2021 (1.0704) and is the lowest since 2009. We have evaluated our beta calculation by comparing it to previous years and expectations. The value of .9946 for beta 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.

Our CAPM used the methodology endorsed by the STB in the previous cost of capital determination, Ex Parte No. 558 (Sub-No. 25). Table 12 is a summary of our CAPM cost of

[35] 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.

common equity calculation, which resulted in an average 2022 cost of equity estimate for the composite railroad of 10.43 percent. This is an increase from 2021's 9.97 percent.

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

Inputs to Model	**2022**	**2021**	
Risk-Free Rate	3.30 %	1.98 %	Table No. 11
Market Risk Premium	7.17	7.46	Appendix H
Beta	0.9946	1.0704	Appendix I
Calculation			
Risk-Free Rate	3.30	1.98	Given
Plus: Beta Adj. Risk Premium	7.13	7.99	Beta x MRP
CAPM Cost of Equity	10.43 %	9.97 %	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. Nonetheless, 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. Investor perceptions of a firm's future

opportunities and potential difficulties will inevitably have a substantial impact on the level of risk that investor associates with a firm. That risk level is, in turn, a major determinate of the rate of return that will be required to encourage acquisition or retention of an equity position in the company. Thus, 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.[36] 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.[37] 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

[36] 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.

[37] 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)

same formula that appeared in the Appendix to the Board's decision in Ex Parte No. 664 (Sub No.1) served August 11, 2008, and it is the same formula found in the AAR's submissions for the 2008 through 2021 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 2018 through 2022. 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.

Table No. 13
Example Cash Flow Calculations for CSX in 2022
($ in millions)

	2018	2019	2020	2021	2022	Total
Net Income	$3,309	$3,331	$2,765	$3,781	$4,166	$17,352
Less Extraord. Items	0	0	0	0	0	0
Inc. Bef. Extraord. Items (+)	$3,309	$3,331	$2,765	$3,781	$4,166	$17,352
Capital Expenditures (-)	$1,745	$1,657	$1,626	$1,791	$2,133	$8,952
Depreciation (+)	1,331	1,349	1,383	1,420	1,500	6,983
Deferred Taxes (+)	279	273	180	167	117	1,016
Cash Flow	$3,174	$3,296	$2,702	$3,577	$3,650	$16,399
Revenue (a.k.a. "Sales")	$12,250	$11,937	$10,583	$12,522	$14,853	$62,145

Ratio of Cash Flow to Sales (Smoothed Ibbotson-style) = ($16,399 / $62,145) = 0.26388
Initial Cash Flow in 2022 (Smoothed Ibbotson-style) = (0.26388 x $14,853) = **$3,919.45**

Ratio of IBEI to Sales (Smoothed Ibbotson-style) = ($17,352 / $62,145) = 0.27922
Terminal Cash Flow input (Smoothed Ibbotson-style) = (0.27922 x $14,853) = **$4,147.22**

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 2022, which is the initial cash flow in the model, is calculated by multiplying revenue for 2022 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 $3,919.45 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 $4,147.22 million. The model's terminal cash flow input is calculated by multiplying revenue for 2022 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. The pages from the 2022 10-K reports that were used as data sources for cash flows are included in my work papers. Data for prior years (2018-2021) used in this year's calculation are unchanged from last year's submission[38] – unless restated/revised data were found in the 2022 10-K statements.

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 (2022) 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

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

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.[39] (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 2022, and stock prices as of December 30, 2022 – the prices at the end of the last full week for 2022.[40] Each growth rate projection was reviewed by the brokerage firm's analyst during 2022, 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 service.[41] 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

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

[40] Friday, December 30, 2022 was the last trading day for the week.

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

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
2022 Thomson Median Growth Rate Estimates

Company	Stock Symbol	Growth Rate
CSX Corporation	CSX	11.84 %
Norfolk Southern Corporation	NSC	9.40
Union Pacific Corporation	UNP	9.60
Simple Average		10.28

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 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".[42] In other words, other companies "catch" their industry growth leaders, or the

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

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 10.28 percent, which is a decrease from 2021 (17.56 percent), and closer to the level it was in 2019 (10.85 percent). For all railroads in the Morningstar/Ibbotson MSDCF model, a second stage growth rate of 10.28 percent is used.[43]

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 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

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

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 2022 is 3.16 percent – which was the same percent used for 2021.

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 2009 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,[44] 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.[45] This addition to the methodology was accepted in the 2015 through 2021 cost of capital determinations, and has been used again for 2022. Comparing yields for long-term government bonds to inflation indexed bonds, I calculate an expected long-term inflation rate of 2.52 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 2022 is 5.68 percent (3.16 +

[44] 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.

[45] 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.

2.52 as also shown on page 1 of Appendix M), which is lower than the 5.73 used for 2021. Although real growth is the same as the previous year, expected inflation is slightly down, and this caused the decrease in the Stage 3 Growth rate calculated for 2022. 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 30, 2022

Company	Stock Price	Shares Outstanding	Market Value ($mil)	Weight
CSX	$30.98	2,102,408,729	65,132.6	26.106 %
NSC	$246.42	231,514,213	57,049.7	22.867
UNP	$207.07	614,800,800	127,306.8	51.027
Total		2,948,723,742	$249,489.2	100.000 %

As directed by the Board, I have used stock prices (from Yahoo! Finance) for December 30, 2022, the last trading day of the week that qualifies as the last week of 2022 for cost of capital purposes. I have also used the shares outstanding for that day from the 2022 Q3 10-Q reports (the latest information available prior to December 30, 2022) 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.[46]

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)

[46] 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.[47]

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 2021 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 30, 2022, 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.[48] 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.

[47] 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.

[48] 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	26.106%	15.15 %	3.95
NSC	22.867%	12.84	2.94
UNP	51.027%	13.03	6.65
Total	100.000%		
Weighted Current Cost of Equity			**13.54 %**

Thus, the MSDCF produces a cost of common equity of 13.54 percent for 2022 – a slight decrease from the 14.09 percent used by the Board for 2021 (2020 was the lowest ever calculated since the MSDCF began being used in 2008).

D. Conclusion as to the Cost of Common Equity Capital

In the STB's Ex Parte No. 558 (Sub-No. 26) decision served February 7, 2023, the Board specified that comments "should focus … using the methodology followed in *Railroad Cost of Capital – 2021",* 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. [49] Once again, it should be noted that each cost of equity model has its strengths and weaknesses, and this illustrates

[49] 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."

the Board's wisdom in using more than one model to estimate the cost of common equity.[50]

The cost of common equity for 2022 is 11.99 percent, which is slightly below the 12.03 percent decided for 2021.

Table No. 17
Cost of Common Equity Capital

Model		
Capital Asset Pricing Model	10.43 %	From Table No. 12
Multi-Stage Discounted Cash Flow	13.54	From Table No. 16
Cost of Common Equity	11.99 %	Average

V. Preferred Equity Capital in 2022

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.

Table No. 18
Average Market Value
For Preferred Equity in 2022

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	$0.0	

[50] 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.

VI. The Overall Cost of Capital In 2022

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 $60.5 billion, $270.1 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 2022 has weights for debt, common equity, and preferred equity of 18.29 percent, 81.71 percent, and 0.00 percent, respectively. Table 19 contains the weights computation and a comparison to the previous year.

Table No. 19
Capital Structure and Weights

		2022		2021	
	Source Table	Market Value (mil)	Capital Structure Weight	Market Value (mil)	Capital Structure Weight
Debt	6	$60,447.5	18.29 %	$61,705.6	17.71 %
Common Equity	10	270,091.0	81.71	286,701.8	82.29
Preferred Equity	18	0.0	0.00	0.0	0.00
Total		$330,538.4	100.00 %	$348,407.5	100.00 %

The market value for debt and common equity decreased from the prior year, while the market value for preferred equity remained at zero. Weights remained similar to their values

for 2021. Debt increased 0.58 percentage points from 2021, while common equity decreased 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 2022 overall cost of capital of 10.58 percent, as shown in Table 20. This is closer to most of the years prior to 2020, while 2020 was an outlier as the lowest cost of capital ever calculated. The increase was caused by higher interest rates and the slight shift in capital structure.

Table No. 20
Weighted Current Cost of Capital for 2022

	Source Table	Capital Structure Weight	Current Cost
Debt	11	18.29 %	4.28 %
Common Equity	18	81.71	11.99
Preferred Equity	20	0.00	0.00
Total		100.000 %	
Weighted Current Cost of Capital			**10.58 %**

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 and operational data related to railroads and their economic and operating environments. 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
12/31/2022

	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	100.671	$553,691	3.330%	$18,438
2	Notes	CSX Corp.	2	126408HD8	3.350%	11/1/2025	$600,000	$600,000	99.656	$597,938	3.510%	$20,988
3	Notes	CSX Corp.	3	126408HE6	2.600%	11/1/2026	$700,000	$700,000	98.100	$686,702	3.700%	$25,408
4	Notes	CSX Corp.	4	126408BP7	7.250%	5/1/2027	$83,312	$83,312	116.391	$96,967	3.870%	$3,753
5	Notes	CSX Corp.	5	126408BM4	7.950%	5/1/2027	$64,266	$64,266	117.329	$75,402	4.000%	$3,016
6	Notes	CSX Corp.	6	126408HH9	3.250%	6/1/2027	$850,000	$850,000	99.373	$844,668	3.790%	$32,013
7	Notes	CSX Corp.	7	12641LBU6	6.800%	12/1/2028	$200,000	$200,000	113.364	$226,728	4.160%	$9,432
8	Notes	CSX Corp.	8	126408HJ5	3.800%	3/1/2028	$800,000	$800,000	100.527	$804,213	3.770%	$30,319
9	Notes	CSX Corp.	9	126408HM8	4.250%	3/15/2029	$950,000	$950,000	101.728	$966,420	3.900%	$37,690
10	Notes	CSX Corp.	10	126408HQ9	2.400%	2/15/2030	$400,000	$400,000	90.776	$363,104	3.950%	$14,343
11	Notes	CSX Corp.	11	126408GH0	6.000%	10/1/2036	$400,000	$400,000	113.419	$453,676	4.380%	$19,871
12	Notes	CSX Corp.	12	126408GK3	6.150%	5/1/2037	$700,000	$700,000	116.574	$816,018	4.510%	$36,802
13	Notes	CSX Corp.	13	126408GP2	7.450%	4/1/2038	$79,226	$79,226	125.494	$99,424	4.910%	$4,882
14	Notes	CSX Corp.	14	126408GS6	6.220%	4/30/2040	$660,000	$660,000	120.179	$793,183	4.710%	$37,359
15	Notes	CSX Corp.	15	126408GU1	5.500%	4/15/2041	$550,000	$550,000	112.042	$616,228	4.660%	$28,716
16	Notes	CSX Corp.	16	126408GW7	4.750%	5/30/2042	$600,000	$600,000	102.707	$616,244	4.600%	$28,347
17	Notes	CSX Corp.	17	126408GX5	4.400%	3/1/2043	$300,000	$300,000	97.368	$292,103	4.670%	$13,641
18	Notes	CSX Corp.	18	126408GY3	4.100%	3/15/2044	$800,000	$800,000	93.518	$748,145	4.400%	$32,918
19	Notes	CSX Corp.	19	126408HF3	3.800%	11/1/2046	$800,000	$800,000	90.153	$721,224	4.380%	$31,590
20	Notes	CSX Corp.	20	126408HK2	4.300%	3/1/2048	$850,000	$850,000	96.446	$819,791	4.430%	$36,317
21	Notes	CSX Corp.	21	126408HN6	4.750%	11/15/2048	$650,000	$650,000	102.096	$663,626	4.460%	$29,598
22	Notes	CSX Corp.	22	126408HP1	4.500%	3/15/2049	$400,000	$400,000	101.151	$404,604	4.430%	$17,924
23	Notes	CSX Corp.	23	126408HR7	3.350%	9/15/2049	$600,000	$600,000	87.600	$525,601	4.430%	$23,284
24	Notes	CSX Corp.	24	126408HC0	3.950%	5/1/2050	$600,000	$600,000	93.094	$558,563	4.320%	$24,130
25	Notes	CSX Corp.	25	126408HA4	4.500%	8/1/2054	$450,000	$450,000	98.254	$442,141	4.430%	$19,587
26	Notes	CSX Corp.	26	126408HG1	4.250%	11/1/2066	$700,000	$700,000	92.840	$649,882	4.690%	$30,479
27	Notes	CSX Corp.	27	126408HL0	4.650%	3/1/2068	$350,000	$350,000	97.633	$341,716	4.630%	$15,821
28	Notes	CSXT - Conrail	28	126410LL1	7.875%	5/15/2043	$99,989	$99,989	133.181	$133,166	5.000%	$6,658
29	Notes (New)	CSX Corp.	29	126408HV8	4.500%	11/15/2052	$900,000	**$487,500**	91.455	$445,842	4.820%	$21,490
30	Notes	CSX Corp.	30	126408HT3	2.500%	5/15/2051	$500,000	$500,000	75.311	$376,553	4.230%	$15,928
31	Notes	CSX Corp.	31	126408HS5	3.800%	4/15/2050	$500,000	$500,000	90.262	$451,308	4.450%	$20,083
32	Notes (New)	CSX Corp.	32	126408HU0	4.100%	11/15/2032	$950,000	**$514,583**	96.048	$494,244	4.410%	$21,796
33												
34												
35												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
Total							**$17,636,793**	**$16,788,876**		**$16,679,113**	**4.273%**	**$712,621**

CSX Corporation
12/31/2022

	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	Notes (New)	CSX Corp.			4.650%	3/1/2068	150,000	150,000	100.000	$150,000		
4												
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24												
25												
26												
27												
28												
29												
30												
Total							**$591,679**	**$591,679**		**$591,679**		

CSX Corporation
12/31/2022

	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 2023						
1	Sec'd Eq Notes	CSXT		126410LM9	6.251%	1/15/2023	$138,567					
2												
3												
4												
5												
6												
7												
8												
9												
10												
Total							**$138,567**					

Grand Totals			
Total Traded and Trading Data Not Available	**$18,228,472**	**$17,380,556**	**$17,270,792**
Grand Total (for reconciliation to carrier data only)	**$18,367,039**		

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

12/31/2022

	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	33	655855FB5	7.875%	5/15/2043	$138,085	$138,085	105.248	$145,332	1.880%	$2,732
2	Notes	Senior	34	655844CK2	2.300%	5/15/2031	$500,000	$500,000	89.323	$446,613	3.770%	$16,837
3	Notes	Senior	35	655844CJ5	4.100%	5/15/2121	$600,000	$600,000	85.661	$513,968	4.990%	$25,647
4	Notes	Senior	36	655844CL0	2.900%	8/25/2051	$600,000	$600,000	78.234	$469,403	4.350%	$20,419
5	Notes	Senior	37	655844CF3	3.050%	5/15/2050	$800,000	$800,000	81.693	$653,541	4.400%	$28,756
6	Notes	Senior	38	655844AQ1	7.250%	2/15/2031	$284,028	$284,028	119.407	$339,149	4.200%	$14,244
7	Notes	Senior	39	655844CH9	3.155%	5/15/2055	$799,996	$799,996	80.586	$644,683	4.470%	$28,817
8	Notes	Senior 144A	40	655844CG1	3.155%	5/15/2055	$1	$1	81.823	$1	4.450%	$0
9	Notes (New)	Senior	41	655844CM8	3.000%	3/15/2032	$600,000	**$525,000**	92.787	$487,132	3.980%	$19,388
10	Notes (New)	Senior	42	655844CN6	3.700%	3/15/2053	$400,000	**$350,000**	86.761	$303,663	4.400%	$13,361
11	Notes	Senior	43	655844BD9	6.000%	5/23/2111	$79,726	$79,726	113.174	$90,229	5.190%	$4,683
12	Notes	Senior 2105	44	655844AV0	6.000%	3/15/2105	$157,780	$157,780	107.846	$170,159	5.460%	$9,291
13	Notes	Senior	45	655844AX6	5.640%	5/17/2029	$210,316	$210,316	108.656	$228,521	3.940%	$9,004
14	Notes	Senior	46	655844AW8	5.590%	5/17/2025	$251,172	$251,172	108.194	$271,752	3.790%	$10,299
15	Notes	Senior	47	655844BH0	4.837%	10/1/2041	$595,504	$595,504	104.169	$620,329	4.560%	$28,287
16	Notes	Senior 144A	48	655844BE7	4.837%	10/1/2041	$0	**$0**	127.956	$0	3.250%	$0
17	Notes	Senior	49	655844BM9	3.950%	10/1/2042	$600,000	$600,000	92.783	$556,699	4.580%	$25,497
18	Notes	Senior	50	655844BN7	4.800%	8/15/2043	$291,829	$291,829	99.661	$290,838	4.910%	$14,280
19	Notes	Senior	51	655844BP2	3.850%	1/15/2024	$400,000	$400,000	100.192	$400,770	3.410%	$13,666
20	Notes	Senior	52	655844BQ0	4.450%	6/15/2045	$500,000	$500,000	99.814	$499,072	4.570%	$22,808
21	Notes	Senior	53	655844BR8	4.650%	1/15/2046	$600,000	$600,000	102.744	$616,462	4.480%	$27,617
22	Notes	Senior	54	655844BS6	2.900%	6/15/2026	$600,000	$600,000	99.022	$594,129	3.710%	$22,042
23	Notes	Senior	55	655844BT4	3.150%	6/1/2027	$300,000	$300,000	99.720	$299,161	3.830%	$11,458
24	Notes	Senior	56	655844BX5	3.942%	11/1/2047	$749,997	$749,997	93.774	$703,300	4.400%	$30,945
25	Notes	Senior	57	655844BV9	4.050%	8/15/2052	$749,994	$749,994	95.778	$718,326	4.480%	$32,181
26	Notes	Senior	58	655844BY3	4.150%	2/28/2048	$700,000	$700,000	95.235	$666,646	4.440%	$29,599
27	Notes	Senior	59	655844CA4	3.650%	8/1/2025	$300,000	$300,000	105.927	$317,782	3.680%	$11,694
28	Notes	Senior	60	655844CC0	4.100%	5/15/2049	$400,000	$400,000	95.379	$381,515	4.520%	$17,244
29	Notes	Senior	61	655844BZ0	3.800%	8/1/2028	$600,000	$600,000	103.478	$620,870	3.930%	$24,400
30	Notes	Senior	62	655844CB2	5.100%	8/1/2118	$350,521	$350,521	97.794	$342,787	5.090%	$17,448
31	Notes	Senior	63	655844CE6	2.550%	11/1/2029	$400,000	$400,000	92.316	$369,263	3.800%	$14,032
32	Notes	Senior	64	655844CD8	3.400%	11/1/2049	$400,000	$400,000	84.370	$337,478	4.370%	$14,748
33	Notes (New)	Senior	65	655844CP1	4.550%	6/1/2053	$750,000	**$437,500**	96.238	$421,043	4.750%	$20,000
34	Conrail Notes	CR NSC 2027	66	655844AJ7	7.800%	5/15/2027	$319,135	$319,135	117.262	$374,224	3.890%	$14,557
35	Conrail Notes	CR NSC 2037	67	655844AF5	7.050%	5/1/2037	$171,750	$171,750	119.582	$205,382	4.980%	$10,228
36	Conrail Notes	CR NSC 2097	68	655844AK4	7.900%	5/15/2097	$196,302	$196,302	143.596	$281,881	5.290%	$14,911
37												
38												
39												
40												
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42												
43												
44												
45												
46												
47												
Total							**$15,396,136**	**$14,958,636**		**$14,382,099**	**4.319%**	**$621,122**

Norfolk Southern Corporation

12/31/2022

	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												
2												
3												
4												
5												
6												
7												
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29												
30												
Total							**$0**	**$0**		**$0**		

Norfolk Southern Corporation

12/31/2022

	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 2023						
1	Notes	Senior		655844BL1	2.903%	2/15/2023	$596,450					
2	Notes	Senior 144A		655844BK3	2.903%	2/15/2023	3,550					
3												
4												
5												
6												
7												
8												
9												
10												
Total							**$600,000**					

	Grand Totals			
Total Traded and Trading Data Not Available	**$15,396,136**	**$14,958,636**		**$14,382,099**
Grand Total (for reconciliation to carrier data only)	**$15,996,136**			

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
12/31/2022

	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.	69	907818CS5	5.375%	6/1/2033	$143,004	$143,004	107.492	$153,717	4.480%	$6,887
2	Debentures	UP Corp.	70	907818CX4	6.150%	5/1/2037	$89,864	$89,864	117.244	$105,360	4.530%	$4,773
3	Debentures	UP Corp.	71	907818CU0	6.250%	5/1/2034	$152,249	$152,249	114.593	$174,466	4.370%	$7,624
4	Debentures	UP Corp.	72	907818CF3	6.625%	2/1/2029	$389,498	$389,498	122.340	$476,513	3.920%	$18,679
5	Debentures	UP Corp.	73	907818BY3	7.125%	2/1/2028	$160,772	$160,772	114.432	$183,975	3.980%	$7,322
6	Notes	UP Corp.	74	907818FJ2	2.150%	2/5/2027	$497,477	$497,477	96.343	$479,283	3.600%	$17,254
7	Notes	UP Corp.	75	907818FU7	2.375%	5/20/2031	$997,428	$997,428	90.911	$906,773	3.790%	$34,367
8	Notes (New)	UP Corp.	76	907818GA0	3.850%	2/14/2072	$493,509	**$538,373**	85.877	$462,338	4.540%	$20,990
9	Notes	UP Corp.	77	907818FH6	2.400%	2/5/2030	$743,519	$743,519	95.773	$712,087	3.940%	$28,056
10	Notes (New)	UP Corp.	78	907818FZ6	3.500%	2/14/2053	$1,234,466	$1,234,466	85.854	$1,059,841	4.180%	$44,301
11	Notes	UP Corp.	79	907818EH7	2.750%	3/1/2026	$648,737	$648,737	98.503	$639,025	3.560%	$22,749
12	Notes (Exchange)	UP Corp. 144A	80	907818FP8	2.891%	4/6/2036	$1,716	$1,716	88.127	$1,512	3.990%	$60
13	Notes (Exchange)	UP Corp.	81	907818FQ6	2.891%	4/6/2036	$604,726	$604,726	90.945	$549,965	4.130%	$22,714
14	Notes (New)	UP Corp.	82	907818FY9	3.375%	2/14/2042	$494,933	$494,933	88.754	$439,271	4.410%	$19,372
15	Notes	UP Corp.	83	907818FW3	2.950%	3/10/2052	$841,228	$841,228	82.250	$691,907	4.270%	$29,544
16	Notes (Exchange)	UP Corp.	84	907818FN3	2.973%	9/16/2062	$713,580	$713,580	76.225	$543,924	4.180%	$22,736
17	Notes (Exchange)	UP Corp. 144A	85	907818FM5	2.973%	9/16/2062	$3,004	$3,004	77.070	$2,315	4.340%	$100
18	Notes	UP Corp.	86	907818EP9	3.000%	4/15/2027	$494,909	$494,909	98.287	$486,432	3.470%	$16,879
19	Notes	UP Corp.	87	907818FA1	3.150%	3/1/2024	$498,996	$498,996	101.024	$504,107	3.210%	$16,182
20	Notes	UP Corp.	88	907818FT0	3.200%	5/20/2041	$991,380	$991,380	87.316	$865,635	4.080%	$35,318
21	Notes	UP Corp.	89	907818DY1	3.250%	1/15/2025	$349,149	$349,149	102.722	$358,654	3.390%	$12,158
22	Notes	UP Corp.	90	907818ED6	3.250%	8/15/2025	$499,541	$499,541	100.113	$500,104	3.480%	$17,404
23	Notes	UP Corp.	91	907818FK9	3.250%	2/5/2050	$1,694,687	$1,694,687	89.498	$1,516,702	4.320%	$65,522
24	Notes	UP Corp.	92	907818EK0	3.350%	8/15/2046	$296,392	$296,392	86.999	$257,857	4.370%	$11,268
25	Notes	UP Corp.	93	907818EB0	3.375%	2/1/2035	$446,019	$446,019	94.872	$423,149	4.150%	$17,561
26	Notes (New)	UP Corp.	94	907818FX1	2.800%	2/14/2032	$1,235,928	$1,235,928	92.744	$1,146,247	3.980%	$45,621
27	Notes	UP Corp.	95	907818FD5	3.550%	8/15/2039	$494,337	$494,337	92.787	$458,680	4.280%	$19,632
28	Notes	UP Corp.	96	907818FV5	3.550%	5/20/2061	$640,298	$640,298	86.704	$555,161	4.400%	$24,427
29	Notes	UP Corp.	97	907818EQ7	3.600%	9/15/2037	$495,595	$495,595	93.695	$464,349	4.160%	$19,317
30	Notes	UP Corp.	98	907818DR6	3.646%	2/15/2024	$425,346	$425,346	101.968	$433,716	3.390%	$14,703
31	Notes	UP Corp.	99	907818FB9	3.700%	3/1/2029	$770,287	$770,287	99.437	$765,948	3.740%	$28,646
32	Notes	UP Corp.	100	907818DV7	3.750%	3/15/2024	$399,123	$399,123	100.807	$402,342	3.410%	$13,720
33	Notes	UP Corp.	101	907818ES3	3.750%	7/15/2025	$498,516	$498,516	103.176	$514,346	3.470%	$17,848
34	Notes	UP Corp.	102	907818FL7	3.750%	2/5/2070	$742,254	$742,254	89.640	$665,353	4.580%	$30,473
35	Notes	UP Corp.	103	907818EM6	3.799%	10/1/2051	$711,310	$711,310	91.656	$651,956	4.230%	$27,578
36	Notes (Exchange)	UP Corp.	104	907818FS2	3.799%	4/6/2071	$816,735	$816,735	87.131	$711,625	4.380%	$31,169
37	Notes (Exchange)	UP Corp. 144A	105	907818FR4	3.799%	4/6/2071	$7,274	$7,274	86.956	$6,325	4.330%	$274
38	Notes	UP Corp.	106	907818FG8	3.839%	3/20/2060	$1,415,676	$1,415,676	90.283	$1,278,117	4.370%	$55,854
39	Notes	UP Corp. 144A	107	907818FF0	3.839%	3/20/2060	$184	$184	88.414	$163	4.540%	$7
40	Notes	UP Corp.	108	907818EC8	3.875%	2/1/2055	$444,243	$444,243	92.065	$408,991	4.390%	$17,955
41	Notes	UP Corp.	109	907818EY0	3.950%	9/10/2028	$1,048,324	$1,048,324	101.226	$1,061,176	3.640%	$38,627
42	Notes	UP Corp.	110	907818FE3	3.950%	8/15/2059	$491,315	$491,315	93.496	$459,361	4.360%	$20,028
43	Notes	UP Corp.	111	907818EN4	4.000%	4/15/2047	$489,565	$489,565	93.779	$459,107	4.390%	$20,155
44	Notes	UP Corp.	112	907818EF1	4.050%	11/15/2045	$395,903	$395,903	93.580	$370,484	4.470%	$16,561
45	Notes	UP Corp.	113	907818EJ3	4.050%	3/1/2046	$515,684	$515,684	94.589	$487,782	4.240%	$20,682
46	Notes	UP Corp.	114	907818ER5	4.100%	9/15/2067	$494,472	$494,472	92.004	$454,933	4.500%	$20,472
47	Notes	UP Corp.	115	907818DZ8	4.150%	1/15/2045	$229,005	$229,005	93.330	$213,730	4.590%	$9,810
48	Notes	UP Corp.	116	907818DP0	4.250%	4/15/2043	$183,566	$183,566	94.962	$174,318	4.570%	$7,966
49	Notes	UP Corp.	117	907818DL9	4.300%	6/15/2042	$204,353	$204,353	97.901	$200,064	4.570%	$9,143
50	Notes	UP Corp.	118	907818FC7	4.300%	3/1/2049	$626,918	$626,918	98.330	$616,448	4.370%	$26,939
51	Notes	UP Corp.	119	907818EV6	4.375%	9/10/2038	$231,065	$231,065	98.368	$227,293	4.360%	$9,910
52	Notes	UP Corp.	120	907818EG9	4.375%	11/15/2065	$169,391	$169,391	95.276	$161,389	4.620%	$7,456
53	Notes	UP Corp.	121	907818EW4	4.500%	9/10/2048	$386,005	$386,005	101.341	$391,181	4.440%	$17,368
54	Notes	UP Corp.	122	907818DJ4	4.750%	9/15/2041	$212,549	$212,549	102.654	$218,190	4.630%	$10,102
55	Notes	UP Corp.	123	907818DU9	4.750%	12/15/2043	$182,761	$182,761	100.035	$182,826	4.500%	$8,227
56	Notes	UP Corp.	124	907818EX2	4.800%	9/10/2058	$25,785	$25,785	97.081	$25,032	5.010%	$1,254
57	Notes	UP Corp.	125	907818DT2	4.821%	2/1/2044	$129,677	$129,677	100.692	$130,575	4.580%	$5,980

Union Pacific Corporation
12/31/2022

	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)
58	Notes	UP Corp. 144A	126	907818DS4	4.821%	2/1/2044	$1	$1	101.270	$1	4.740%	$0
59	Notes	UP Corp.	127	907818DX3	4.850%	6/15/2044	$83,324	$83,324	98.511	$82,083	4.890%	$4,014
60	Notes	UP Corp.	128	907818DF2	5.780%	7/15/2040	$64,335	$64,335	109.822	$70,654	4.710%	$3,328
61	Notes	UP Corp. 144A	129	907818DE5	5.780%	7/15/2040	$10	$10	110.445	$11	4.840%	$1
62	Notes (New)	UP Corp.	130	907818GB8	4.500%	1/20/2033	$890,049	$890,049	102.831	$915,249	4.560%	$41,735
63	Notes (New)	UP Corp.	131	907818GD4	5.150%	1/20/2063	$393,074	$393,074	96.259	$378,368	4.920%	$18,616
64	Notes (New)	UP Corp.	132	907818GC6	4.950%	9/9/2052	$589,946	$589,946	99.959	$589,704	4.780%	$28,188
65												
Total							**$30,614,966**	**$30,659,830**		**$28,828,193**	**4.140%**	**$1,193,606**
							Trading Data Not Available or Did Not Trade					
1												
2												
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4												
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30												
Total							**$0**	**$0**		**$0**		

Union Pacific Corporation

12/31/2022

	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 2023								
1	Notes	UP Corp.		907818DN5	2.750%	4/15/2023	324,834					
2	Notes	UP Corp.		907818DM7	2.950%	1/15/2023	299,978					
3	Notes	UP Corp.		907818EU8	3.500%	6/8/2023	649,431					
4												
5												
6												
7												
8												
9												
10												
Total							**$1,274,243**					

	Grand Totals			
Total Traded and Trading Data Not Available	**$30,614,966**	**$30,659,830**		**$28,828,193**
Grand Total (for reconciliation to carrier data only)	**$31,889,209**			

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 2022	Price	Yield
January	104.071	1.73 %
February	103.052	2.10
March	101.201	2.86
April	100.178	3.32
May	100.604	3.11
June	99.568	3.62
July	100.256	3.27
August	99.084	3.90
September	97.667	4.75
October	97.321	5.02
November	97.926	4.71
December	107.126	1.59
Average	100.671	3.33 %

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 2022	Price	Yield
January	104.938	1.98 %
February	103.555	2.33
March	100.910	3.08
April	99.219	3.59
May	100.095	3.32
June	98.474	3.84
July	99.914	3.38
August	97.842	4.08
September	95.359	5.00
October	95.149	5.12
November	96.535	4.63
December	103.885	1.72
Average	99.656	3.51 %

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 2022	Price	Yield
January	102.409	2.06 %
February	101.122	2.34
March	98.125	3.04
April	95.169	3.78
May	95.766	3.65
June	94.333	4.04
July	97.101	3.34
August	94.595	4.02
September	90.999	5.07
October	90.966	5.13
November	93.533	4.42
December	123.086	3.50
Average	98.100	3.70 %

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 2022	Price	Yield
January	123.980	2.36 %
February	121.762	2.71
March	118.309	3.30
April	114.481	4.02
May	115.330	3.80
June	113.543	4.12
July	115.578	3.65
August	112.064	4.36
September	108.023	5.25
October	107.402	5.38
November	109.930	4.73
December	136.285	2.73
Average	116.391	3.87 %

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 2022	Price	Yield
January	126.312	2.56 %
February	124.519	2.81
March	120.962	3.42
April	117.048	4.14
May	117.878	3.91
June	116.026	4.24
July	118.065	3.76
August	114.515	4.47
September	110.393	5.36
October	109.728	5.48
November	112.192	4.85
December	120.306	3.03
Average	117.329	4.00 %

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 2022	Price	Yield
January	104.819	2.28 %
February	103.451	2.54
March	100.514	3.14
April	96.716	3.97
May	97.728	3.75
June	96.009	4.16
July	99.207	3.43
August	96.265	4.12
September	92.119	5.18
October	91.774	5.30
November	94.604	4.59
December	119.266	3.06
Average	99.373	3.79 %

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 2022	Price	Yield
January	126.024	2.61 %
February	124.119	2.85
March	119.188	3.54
April	114.112	4.31
May	115.021	4.14
June	112.941	4.46
July	115.850	3.95
August	111.308	4.69
September	106.086	5.62
October	105.522	5.71
November	108.505	5.13
December	101.691	2.96
Average	113.364	4.16 %

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 2022	Price	Yield
January	107.386	2.48 %
February	105.798	2.75
March	103.197	3.20
April	99.162	3.96
May	99.839	3.83
June	98.009	4.20
July	101.016	3.60
August	97.733	4.27
September	93.771	5.13
October	93.491	5.21
November	96.328	4.59
December	110.590	2.07
Average	100.527	3.77 %

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 2022	Price	Yield
January	110.493	2.62 %
February	108.755	2.87
March	105.916	3.29
April	100.328	4.19
May	101.959	3.92
June	99.463	4.34
July	102.776	3.77
August	99.083	4.41
September	94.262	5.31
October	93.998	5.37
November	97.287	4.75
December	106.421	1.90
Average	101.728	3.90 %

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 2022	Price	Yield
January	98.884	2.55 %
February	97.266	2.79
March	94.528	3.19
April	88.711	4.11
May	89.832	3.94
June	87.989	4.26
July	91.276	3.74
August	87.224	4.43
September	82.567	5.29
October	82.377	5.35
November	86.088	4.70
December	102.569	3.03
Average	90.776	3.95 %

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 2022	Price	Yield
January	130.908	3.32 %
February	128.606	3.48
March	123.903	3.84
April	113.619	4.69
May	114.358	4.62
June	110.741	4.94
July	116.767	4.40
August	110.537	4.95
September	102.294	5.76
October	100.495	5.95
November	106.385	5.34
December	102.414	1.21
Average	113.419	4.38 %

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 2022	Price	Yield
January	133.989	3.30 %
February	130.466	3.54
March	125.547	3.89
April	115.151	4.73
May	117.442	4.53
June	112.920	4.91
July	119.361	4.36
August	112.544	4.94
September	103.821	5.76
October	102.503	5.89
November	108.978	5.25
December	116.166	3.03
Average	116.574	4.51 %

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 2022	Price	Yield
January	144.022	3.78 %
February	140.575	4.00
March	137.042	4.24
April	125.087	5.12
May	125.696	5.07
June	122.310	5.34
July	127.863	4.88
August	121.536	5.39
September	113.327	6.11
October	111.385	6.29
November	118.173	5.66
December	118.915	3.09
Average	125.494	4.91 %

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 2022	Price	Yield
January	137.350	3.45 %
February	133.565	3.67
March	128.583	3.99
April	117.035	4.80
May	117.826	4.73
June	113.546	5.06
July	118.889	4.65
August	114.395	4.98
September	104.637	5.80
October	102.651	5.97
November	110.318	5.30
December	143.355	4.15
Average	120.179	4.71 %

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 2022	Price	Yield
January	128.500	3.46 %
February	124.570	3.70
March	120.137	3.98
April	108.350	4.82
May	109.917	4.70
June	105.506	5.04
July	111.238	4.60
August	106.024	5.00
September	97.660	5.71
October	95.358	5.92
November	103.320	5.22
December	133.918	3.78
Average	112.042	4.66 %

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 2022	Price	Yield
January	119.075	3.44 %
February	115.482	3.66
March	110.889	3.96
April	99.528	4.79
May	100.353	4.72
June	95.535	5.11
July	102.241	4.58
August	97.011	4.99
September	89.008	5.69
October	86.241	5.95
November	93.601	5.28
December	123.523	3.04
Average	102.707	4.60 %

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 2022	Price	Yield
January	114.052	3.46 %
February	108.802	3.79
March	105.725	3.99
April	94.252	4.84
May	94.999	4.78
June	91.815	5.04
July	96.747	4.65
August	91.982	5.03
September	84.538	5.69
October	81.842	5.95
November	89.237	5.27
December	114.420	3.57
Average	97.368	4.67 %

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 2022	Price	Yield
January	110.805	3.40 %
February	106.678	3.66
March	102.655	3.92
April	91.318	4.74
May	92.130	4.68
June	88.083	5.01
July	94.133	4.53
August	89.045	4.93
September	80.950	5.64
October	78.869	5.84
November	85.660	5.22
December	101.891	1.19
Average	93.518	4.40 %

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 2022	Price	Yield
January	107.108	3.37 %
February	102.372	3.65
March	100.358	3.78
April	88.135	4.61
May	89.075	4.55
June	84.969	4.86
July	90.415	4.45
August	85.536	4.82
September	77.146	5.53
October	73.968	5.83
November	81.263	5.17
December	101.491	1.89
Average	90.153	4.38 %

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 2022	Price	Yield
January	114.872	3.43 %
February	109.524	3.73
March	107.409	3.85
April	94.576	4.66
May	95.804	4.58
June	92.185	4.83
July	97.587	4.46
August	91.265	4.90
September	83.213	5.54
October	80.378	5.79
November	87.611	5.19
December	102.928	2.14
Average	96.446	4.43 %

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 2022	Price	Yield
January	122.689	3.45 %
February	116.858	3.75
March	114.602	3.87
April	100.156	4.74
May	102.309	4.60
June	97.890	4.89
July	103.940	4.49
August	97.942	4.89
September	88.976	5.55
October	85.693	5.82
November	93.177	5.23
December	100.924	2.19
Average	102.096	4.46 %

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 2022	Price	Yield
January	118.666	3.44 %
February	112.900	3.74
March	110.654	3.86
April	97.644	4.65
May	98.600	4.59
June	94.664	4.86
July	99.756	4.52
August	94.375	4.88
September	85.681	5.54
October	81.854	5.86
November	89.135	5.27
December	129.882	1.91
Average	101.151	4.43 %

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 2022	Price	Yield
January	100.193	3.34 %
February	95.429	3.61
March	93.690	3.72
April	81.858	4.51
May	82.385	4.47
June	78.219	4.79
July	83.889	4.37
August	78.770	4.75
September	70.976	5.41
October	67.827	5.70
November	74.758	5.09
December	143.208	3.41
Average	87.600	4.43 %

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 2022	Price	Yield
January	110.281	3.38 %
February	105.370	3.64
March	103.346	3.76
April	90.045	4.59
May	90.899	4.53
June	87.031	4.80
July	93.017	4.39
August	87.707	4.75
September	78.977	5.43
October	75.295	5.75
November	82.347	5.16
December	112.811	1.66
Average	93.094	4.32 %

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 2022	Price	Yield
January	114.709	3.59 %
February	107.746	3.88
March	104.015	4.05
April	89.642	4.82
May	90.097	4.79
June	85.160	5.10
July	91.673	4.70
August	86.414	5.02
September	76.987	5.68
October	72.710	6.02
November	81.090	5.38
December	113.840	3.24
Average	92.840	4.69 %

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 2022	Price	Yield
January	118.612	3.53 %
February	113.855	3.76
March	110.638	3.92
April	96.925	4.69
May	97.158	4.67
June	93.209	4.92
July	98.863	4.57
August	92.657	4.96
September	83.800	5.60
October	80.495	5.86
November	87.999	5.28
December	104.832	1.43
Average	98.254	4.43 %

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 2022	Price	Yield
January	120.381	3.72 %
February	114.415	3.97
March	110.731	4.13
April	95.696	4.89
May	96.656	4.83
June	92.029	5.10
July	98.416	4.74
August	91.768	5.12
September	81.414	5.82
October	77.940	6.09
November	86.788	5.44
December	105.362	1.65
Average	97.633	4.63 %

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 2022	Price	Yield
January	160.606	3.73 %
February	154.305	4.04
March	145.556	4.51
April	134.434	5.17
May	129.386	5.50
June	129.586	5.48
July	133.564	5.21
August	127.924	5.58
September	121.356	6.05
October	116.618	6.41
November	122.576	5.95
December	122.255	2.34
Average	133.181	5.00 %

Source: Bloomberg

CSX Corporation

29

Type:	Notes (New)
Description:	CSX Corp.
CUSIP:	126408HV8
Coupon Rate:	4.500%
Maturity Date:	11/15/2052
Amount Outstanding ($ 000)	$900,000
Months Outstanding	6.5

End of Month in 2022	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	Not Traded	-
June	Not Traded	-
July	100.333	4.48
August	92.959	4.95
September	84.423	5.57
October	81.775	5.79
November	90.142	5.15
December	99.096	2.95
Average	91.455	4.82 %

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 2022	Price	Yield
January	86.043	3.24 %
February	82.495	3.46
March	81.051	3.55
April	70.092	4.32
May	71.955	4.18
June	67.585	4.52
July	72.063	4.18
August	66.483	4.62
September	59.686	5.23
October	57.026	5.50
November	62.726	4.96
December	126.521	3.04
Average	75.311	4.23 %

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 2022	Price	Yield
January	107.858	3.37 %
February	103.104	3.62
March	101.292	3.73
April	88.202	4.55
May	88.549	4.53
June	84.738	4.80
July	90.432	4.40
August	83.913	4.87
September	75.944	5.51
October	72.826	5.79
November	79.468	5.22
December	106.814	3.04
Average	90.262	4.45 %

Source: Bloomberg

CSX Corporation

32

Type:	Notes (New)
Description:	CSX Corp.
CUSIP:	126408HU0
Coupon Rate:	4.100%
Maturity Date:	11/15/2032
Amount Outstanding ($ 000)	$950,000
Months Outstanding	6.5

End of Month in 2022	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	Not Traded	-
June	Not Traded	-
July	101.563	3.91
August	96.322	4.56
September	90.483	5.33
October	90.244	5.37
November	95.398	4.68
December	102.275	2.59
Average	96.048	4.41 %

Source: Bloomberg

Norfolk Southern Corp.

33

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 2022	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	Not Traded	-
November	Not Traded	-
December	105.248	1.88
Average	105.248	1.88 %

Source: Bloomberg

Norfolk Southern Corp.

34

Type:	Notes
Description:	Senior
CUSIP:	655844CK2
Coupon Rate:	2.300%
Maturity Date:	5/15/2031
Amount Outstanding ($ 000)	$500,000
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	97.693	2.58 %
February	96.137	2.78
March	93.117	3.18
April	86.617	4.09
May	87.779	3.93
June	85.956	4.22
July	89.800	3.67
August	86.099	4.23
September	80.044	5.20
October	79.671	5.29
November	84.115	4.59
December	104.844	1.50
Average	89.323	3.77 %

Source: Bloomberg

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

Norfolk Southern Corp.

35

Type:	Notes
Description:	Senior
CUSIP:	655844CJ5
Coupon Rate:	4.100%
Maturity Date:	5/15/2121
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	104.112	3.94 %
February	97.409	4.21
March	95.812	4.28
April	79.706	5.15
May	79.874	5.14
June	76.247	5.39
July	80.564	5.10
August	76.101	5.40
September	67.669	6.07
October	64.871	6.33
November	71.675	5.73
December	133.896	3.14
Average	85.661	4.99 %

Source: Bloomberg

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

Norfolk Southern Corp.

36

Type:	Notes
Description:	Senior
CUSIP:	655844CL0
Coupon Rate:	2.900%
Maturity Date:	8/25/2051
Amount Outstanding ($ 000)	$600,000
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	92.597	3.29 %
February	88.187	3.55
March	86.782	3.64
April	74.685	4.46
May	76.938	4.29
June	71.728	4.69
July	77.305	4.27
August	72.043	4.67
September	63.395	5.42
October	60.309	5.73
November	67.309	5.07
December	107.528	3.10
Average	78.234	4.35 %

Source: Bloomberg

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

Norfolk Southern Corp.

37

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 2022	Price	Yield
January	94.428	3.36 %
February	90.898	3.56
March	89.665	3.64
April	76.577	4.53
May	78.440	4.40
June	73.774	4.76
July	79.113	4.35
August	73.522	4.79
September	65.447	5.50
October	62.966	5.74
November	69.912	5.10
December	125.570	3.10
Average	81.693	4.40 %

Source: Bloomberg

Norfolk Southern Corp.

38

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 2022	Price	Yield
January	133.617	2.98 %
February	130.817	3.25
March	126.466	3.72
April	119.295	4.56
May	120.240	4.42
June	118.777	4.59
July	122.493	4.10
August	117.858	4.67
September	113.103	5.29
October	108.945	5.87
November	114.108	5.12
December	107.165	1.85
Average	119.407	4.20 %

Source: Bloomberg

Norfolk Southern Corp.

39

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 2022	Price	Yield
January	94.812	3.42 %
February	91.480	3.60
March	89.632	3.70
April	75.977	4.57
May	77.468	4.47
June	73.018	4.79
July	78.364	4.41
August	73.120	4.79
September	64.278	5.53
October	61.498	5.80
November	68.762	5.15
December	118.621	3.41
Average	80.586	4.47 %

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.

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

Norfolk Southern Corp.

40

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 2022	Price	Yield
January	96.297	3.34 %
February	92.452	3.54
March	89.964	3.68
April	76.438	4.54
May	76.828	4.51
June	73.844	4.73
July	78.350	4.41
August	73.051	4.80
September	64.251	5.53
October	61.412	5.81
November	68.453	5.17
December	130.531	3.35
Average	81.823	4.45 %

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.

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

Norfolk Southern Corp.

41

Type:	Notes (New)
Description:	Senior
CUSIP:	655844CM8
Coupon Rate:	3.000%
Maturity Date:	3/15/2032
Amount Outstanding ($ 000)	$600,000
Months Outstanding	10.5

End of Month in 2022	Price	Yield
January	Not Traded	- %
February	101.674	2.81
March	97.548	3.29
April	90.665	4.16
May	92.001	4.00
June	90.327	4.23
July	94.216	3.72
August	89.772	4.32
September	83.854	5.18
October	83.021	5.33
November	87.286	4.71
December	110.293	2.01
Average	92.787	3.98 %

Source: Bloomberg

Norfolk Southern Corp.

42

Type:	Notes (New)
Description:	Senior
CUSIP:	655844CN6
Coupon Rate:	3.700%
Maturity Date:	3/15/2053
Amount Outstanding ($ 000)	$400,000
Months Outstanding	10.5

End of Month in 2022	Price	Yield
January	Not Traded	- %
February	101.813	3.60
March	99.621	3.72
April	85.731	4.57
May	86.788	4.50
June	82.475	4.80
July	88.537	4.38
August	82.001	4.83
September	73.185	5.53
October	69.817	5.83
November	77.623	5.17
December	106.777	1.52
Average	86.761	4.40 %

Source: Bloomberg

Norfolk Southern Corp.

43

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 2022	Price	Yield
January	137.257	4.35 %
February	132.574	4.50
March	126.453	4.73
April	111.816	5.36
May	110.723	5.41
June	106.836	5.61
July	114.615	5.23
August	107.817	5.56
September	98.002	6.12
October	92.754	6.47
November	102.496	5.85
December	116.746	3.06
Average	113.174	5.19 %

Source: Bloomberg

Norfolk Southern Corp.

44

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 2022	Price	Yield
January	137.416	4.33 %
February	125.319	4.77
March	120.192	4.98
April	105.072	5.71
May	104.844	5.72
June	101.261	5.92
July	108.179	5.54
August	98.751	6.08
September	93.024	6.45
October	88.270	6.80
November	96.808	6.20
December	115.010	3.01
Average	107.846	5.46 %

Source: Bloomberg

Norfolk Southern Corp.

45

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 2022	Price	Yield
January	119.646	2.66 %
February	117.235	2.97
March	114.364	3.35
April	108.949	4.16
May	109.136	4.12
June	107.928	4.29
July	109.885	3.96
August	106.828	4.45
September	101.512	5.36
October	99.797	5.68
November	103.186	5.06
December	105.405	1.26
Average	108.656	3.94 %

Source: Bloomberg

Norfolk Southern Corp.

46

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 2022	Price	Yield
January	111.331	2.01 %
February	110.002	2.34
March	107.232	3.14
April	105.202	3.76
May	105.607	3.58
June	104.005	4.09
July	104.795	3.76
August	103.004	4.40
September	100.804	5.26
October	101.015	5.16
November	101.653	4.87
December	143.672	3.08
Average	108.194	3.79 %

Source: Bloomberg

Norfolk Southern Corp.

47

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 2022	Price	Yield
January	120.653	3.39 %
February	117.190	3.61
March	113.052	3.88
April	101.888	4.69
May	102.763	4.62
June	98.118	4.99
July	104.047	4.52
August	98.155	4.99
September	89.975	5.71
October	87.239	5.97
November	94.586	5.29
December	122.358	3.05
Average	104.169	4.56 %

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.

47	Exchange traded	$595,504
48	Rule 144-A	**0**
		$595,504

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

Norfolk Southern Corp.

48

Type:	Notes
Description:	Senior 144A
CUSIP:	655844BE7
Coupon Rate:	4.837%
Maturity Date:	10/1/2041
Amount Outstanding ($ 000)	$0
Months Outstanding	1.0

End of Month in 2022	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	Not Traded	-
November	Not Traded	-
December	127.956	3.25
Average	127.956	3.25 %

Source: Bloomberg

Norfolk Southern Corp.

49

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 2022	Price	Yield
January	109.008	3.34 %
February	105.249	3.59
March	101.593	3.84
April	91.110	4.63
May	91.718	4.58
June	87.781	4.91
July	92.878	4.49
August	87.553	4.93
September	81.096	5.52
October	77.259	5.91
November	84.546	5.21
December	103.606	4.05
Average	92.783	4.58 %

Source: Bloomberg

Norfolk Southern Corp.

50

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 2022	Price	Yield
January	115.035	3.77 %
February	111.525	4.00
March	107.050	4.29
April	95.531	5.15
May	95.311	5.17
June	93.157	5.34
July	98.693	4.90
August	94.056	5.27
September	85.486	6.03
October	83.231	6.25
November	91.277	5.51
December	125.575	3.25
Average	99.661	4.91 %

Source: Bloomberg

Norfolk Southern Corp.

51

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 2022	Price	Yield
January	103.870	1.82 %
February	103.246	2.07
March	101.608	2.92
April	100.860	3.32
May	101.116	3.14
June	100.444	3.55
July	100.699	3.35
August	100.115	3.76
September	99.031	4.63
October	99.040	4.68
November	98.916	4.85
December	93.364	2.83
Average	100.192	3.41 %

Source: Bloomberg

Norfolk Southern Corp.

52

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 2022	Price	Yield
January	116.282	3.43 %
February	112.237	3.66
March	108.120	3.91
April	96.531	4.70
May	97.440	4.63
June	93.353	4.94
July	99.130	4.51
August	93.685	4.91
September	84.303	5.69
October	81.045	5.99
November	88.716	5.32
December	126.931	3.17
Average	99.814	4.57 %

Source: Bloomberg

Norfolk Southern Corp.

53

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 2022	Price	Yield
January	119.598	3.44 %
February	115.068	3.69
March	112.169	3.86
April	99.555	4.68
May	100.147	4.64
June	97.013	4.86
July	101.367	4.55
August	96.080	4.93
September	87.661	5.61
October	83.938	5.93
November	91.506	5.29
December	128.821	2.27
Average	102.744	4.48 %

Source: Bloomberg

Norfolk Southern Corp.

54

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 2022	Price	Yield
January	103.491	2.06 %
February	102.383	2.31
March	99.058	3.14
April	96.758	3.76
May	96.961	3.72
June	95.846	4.05
July	97.938	3.47
August	95.681	4.14
September	92.972	5.01
October	92.717	5.13
November	94.501	4.60
December	119.952	3.11
Average	99.022	3.71 %

Source: Bloomberg

Norfolk Southern Corp.

55

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 2022	Price	Yield
January	104.413	2.27 %
February	103.111	2.51
March	99.313	3.30
April	96.575	3.90
May	97.526	3.70
June	95.406	4.20
July	97.764	3.66
August	95.291	4.26
September	92.204	5.05
October	91.563	5.25
November	93.830	4.69
December	129.646	3.11
Average	99.720	3.83 %

Source: Bloomberg

Norfolk Southern Corp.

56

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 2022	Price	Yield
January	109.153	3.41 %
February	104.729	3.66
March	102.519	3.79
April	89.681	4.64
May	90.751	4.56
June	87.035	4.84
July	92.233	4.46
August	87.064	4.84
September	77.986	5.58
October	75.297	5.83
November	82.436	5.21
December	126.401	2.00
Average	93.774	4.40 %

Source: Bloomberg

Norfolk Southern Corp.

57

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 2022	Price	Yield
January	112.016	3.41 %
February	106.910	3.67
March	104.685	3.79
April	90.590	4.63
May	91.780	4.55
June	87.088	4.87
July	93.738	4.43
August	87.265	4.86
September	77.583	5.60
October	74.485	5.87
November	83.684	5.13
December	139.506	2.93
Average	95.778	4.48 %

Source: Bloomberg

Norfolk Southern Corp.

58

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 2022	Price	Yield
January	112.647	3.41 %
February	108.009	3.67
March	105.168	3.83
April	92.379	4.66
May	93.862	4.56
June	89.578	4.87
July	95.226	4.47
August	90.030	4.84
September	80.651	5.58
October	77.104	5.90
November	84.784	5.24
December	113.383	2.23
Average	95.235	4.44 %

Source: Bloomberg

Norfolk Southern Corp.

59

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 2022	Price	Yield
January	105.419	2.04 %
February	104.319	2.33
March	101.542	3.16
April	99.917	3.68
May	100.501	3.48
June	99.864	3.70
July	100.356	3.52
August	98.830	4.08
September	96.441	5.02
October	96.273	5.12
November	97.424	4.69
December	170.242	3.28
Average	105.927	3.68 %

Source: Bloomberg

Norfolk Southern Corp.

60

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 2022	Price	Yield
January	112.103	3.41 %
February	107.742	3.65
March	104.858	3.81
April	92.217	4.61
May	92.527	4.59
June	88.862	4.85
July	94.203	4.47
August	88.838	4.85
September	79.734	5.57
October	75.943	5.91
November	84.176	5.21
December	123.341	3.26
Average	95.379	4.52 %

Source: Bloomberg

Norfolk Southern Corp.

61

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 2022	Price	Yield
January	107.496	2.54 %
February	106.047	2.76
March	102.404	3.37
April	98.909	4.00
May	99.517	3.89
June	98.230	4.13
July	100.950	3.62
August	97.486	4.29
September	93.145	5.18
October	92.675	5.29
November	96.127	4.58
December	148.753	3.49
Average	103.478	3.93 %

Source: Bloomberg

Norfolk Southern Corp.

62

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 2022	Price	Yield
January	123.859	4.10 %
February	117.247	4.34
March	111.182	4.58
April	95.597	5.34
May	95.806	5.32
June	92.883	5.49
July	96.713	5.28
August	90.499	5.64
September	82.804	6.16
October	77.502	6.58
November	85.498	5.97
December	103.933	2.33
Average	97.794	5.09 %

Source: Bloomberg

Norfolk Southern Corp.

63

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 2022	Price	Yield
January	100.319	2.50 %
February	99.024	2.69
March	95.938	3.16
April	90.157	4.09
May	91.191	3.93
June	90.107	4.13
July	92.881	3.68
August	89.023	4.35
September	84.113	5.27
October	83.449	5.42
November	87.309	4.72
December	104.279	1.67
Average	92.316	3.80 %

Source: Bloomberg

Norfolk Southern Corp.

64

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 2022	Price	Yield
January	101.123	3.34 %
February	96.766	3.59
March	93.806	3.76
April	81.943	4.56
May	82.539	4.52
June	78.513	4.82
July	84.728	4.36
August	78.873	4.80
September	70.719	5.49
October	67.457	5.80
November	74.152	5.19
December	101.815	2.16
Average	84.370	4.37 %

Source: Bloomberg

Norfolk Southern Corp.

65

Type:	Notes (New)
Description:	Senior
CUSIP:	655844CP1
Coupon Rate:	4.550%
Maturity Date:	6/1/2053
Amount Outstanding ($ 000)	$750,000
Months Outstanding	7.0

End of Month in 2022	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	Not Traded	-
June	94.430	4.90
July	100.636	4.51
August	94.365	4.91
September	84.264	5.63
October	81.218	5.88
November	90.004	5.21
December	128.751	2.20
Average	96.238	4.75 %

Source: Bloomberg

Norfolk Southern Corp.

66

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 2022	Price	Yield
January	127.077	2.33 %
February	125.608	2.52
March	120.619	3.38
April	117.245	3.98
May	117.551	3.87
June	116.172	4.10
July	117.882	3.69
August	113.994	4.47
September	110.198	5.28
October	109.952	5.30
November	112.167	4.74
December	118.678	2.97
Average	117.262	3.89 %

Source: Bloomberg

Norfolk Southern Corp.

67

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 2022	Price	Yield
January	139.054	3.68 %
February	140.993	3.53
March	128.110	4.47
April	118.574	5.25
May	118.419	5.25
June	115.735	5.48
July	120.899	5.03
August	115.199	5.52
September	108.515	6.16
October	104.930	6.52
November	111.228	5.88
December	113.329	3.03
Average	119.582	4.98 %

Source: Bloomberg

Norfolk Southern Corp.

68

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 2022	Price	Yield
January	184.823	4.19 %
February	168.653	4.62
March	163.212	4.79
April	142.544	5.51
May	141.674	5.55
June	136.763	5.75
July	146.275	5.37
August	137.771	5.71
September	125.885	6.26
October	119.313	6.61
November	130.711	6.03
December	125.522	3.06
Average	143.596	5.29 %

Source: Bloomberg

Union Pacific Corp.

69

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818CS5
Coupon Rate:	5.375%
Maturity Date:	6/1/2033
Amount Outstanding ($ 000)	$143,004
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	120.276	3.22 %
February	117.666	3.46
March	113.617	3.86
April	106.135	4.66
May	106.723	4.59
June	104.415	4.85
July	108.889	4.34
August	104.417	4.84
September	98.126	5.61
October	97.689	5.67
November	102.424	5.07
December	109.521	3.53
Average	107.492	4.48 %

Source: Bloomberg

Union Pacific Corp.

70

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818CX4
Coupon Rate:	6.150%
Maturity Date:	5/1/2037
Amount Outstanding ($ 000)	$89,864
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	133.747	3.31 %
February	132.210	3.41
March	126.815	3.80
April	115.769	4.68
May	116.018	4.65
June	113.161	4.89
July	118.328	4.44
August	112.720	4.92
September	105.267	5.62
October	104.380	5.70
November	109.997	5.16
December	118.515	3.73
Average	117.244	4.53 %

Source: Bloomberg

Union Pacific Corp.

71

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818CU0
Coupon Rate:	6.250%
Maturity Date:	5/1/2034
Amount Outstanding ($ 000)	$152,249
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	130.727	3.20 %
February	129.255	3.31
March	122.859	3.86
April	114.381	4.67
May	114.825	4.62
June	112.290	4.87
July	116.814	4.40
August	111.785	4.91
September	104.361	5.73
October	104.104	5.76
November	107.416	5.37
December	106.294	1.75
Average	114.593	4.37 %

Source: Bloomberg

Union Pacific Corp.

72

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818CF3
Coupon Rate:	6.625%
Maturity Date:	2/1/2029
Amount Outstanding ($ 000)	$389,498
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	126.661	2.46 %
February	125.371	2.59
March	121.206	3.15
April	115.452	3.99
May	116.344	3.82
June	114.066	4.16
July	116.539	3.74
August	113.070	4.27
September	107.811	5.16
October	107.518	5.20
November	110.991	4.56
December	193.056	3.99
Average	122.340	3.92 %

Source: Bloomberg

Union Pacific Corp.

73

Type:	Debentures
Description:	UP Corp.
CUSIP:	907818BY3
Coupon Rate:	7.125%
Maturity Date:	2/1/2028
Amount Outstanding ($ 000)	$160,772
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	125.526	2.51 %
February	124.182	2.68
March	120.149	3.29
April	115.964	3.99
May	116.829	3.79
June	114.956	4.10
July	117.636	3.56
August	111.589	4.68
September	106.920	5.60
October	106.812	5.61
November	109.921	4.92
December	102.701	3.03
Average	114.432	3.98 %

Source: Bloomberg

Union Pacific Corp.

74

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FJ2
Coupon Rate:	2.150%
Maturity Date:	2/5/2027
Amount Outstanding ($ 000)	$497,477
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	100.398	2.07 %
February	98.914	2.39
March	96.261	2.99
April	93.628	3.62
May	94.286	3.49
June	92.980	3.83
July	95.318	3.28
August	92.762	3.95
September	89.570	4.85
October	89.171	5.00
November	91.877	4.30
December	120.947	3.42
Average	96.343	3.60 %

Source: Bloomberg

Union Pacific Corp.

75

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FU7
Coupon Rate:	2.375%
Maturity Date:	5/20/2031
Amount Outstanding ($ 000)	$997,428
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	98.357	2.58 %
February	97.022	2.74
March	93.792	3.16
April	87.739	4.00
May	89.059	3.83
June	86.791	4.17
July	90.972	3.58
August	86.751	4.21
September	81.401	5.06
October	81.305	5.10
November	85.624	4.43
December	112.121	2.65
Average	90.911	3.79 %

Source: Bloomberg

Union Pacific Corp.

76

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818GA0
Coupon Rate:	3.850%
Maturity Date:	2/14/2072
Amount Outstanding ($ 000)	$493,509
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	Not Traded	- %
February	100.884	3.81
March	99.549	3.87
April	84.778	4.64
May	86.262	4.55
June	81.814	4.82
July	87.578	4.48
August	81.335	4.85
September	71.865	5.52
October	68.782	5.77
November	76.752	5.16
December	105.045	2.47
Average	85.877	4.54 %

Source: Bloomberg

Union Pacific Corp.

77

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FH6
Coupon Rate:	2.400%
Maturity Date:	2/5/2030
Amount Outstanding ($ 000)	$743,519
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	99.086	2.53 %
February	97.593	2.74
March	94.679	3.17
April	89.329	4.01
May	90.362	3.86
June	88.668	4.16
July	91.991	3.63
August	88.107	4.29
September	83.485	5.13
October	83.306	5.19
November	86.977	4.55
December	155.688	3.98
Average	95.773	3.94 %

Source: Bloomberg

Union Pacific Corp.

78

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818FZ6
Coupon Rate:	3.500%
Maturity Date:	2/14/2053
Amount Outstanding ($ 000)	$1,234,466
Months Outstanding	11.0

End of Month in 2022	Price	Yield
January	Not Traded	- %
February	100.213	3.49
March	97.880	3.61
April	84.380	4.44
May	86.783	4.28
June	81.890	4.61
July	87.149	4.26
August	80.969	4.68
September	72.702	5.32
October	70.330	5.53
November	78.455	4.87
December	103.645	0.92
Average	85.854	4.18 %

Source: Bloomberg

Union Pacific Corp.

79

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EH7
Coupon Rate:	2.750%
Maturity Date:	3/1/2026
Amount Outstanding ($ 000)	$648,737
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	102.868	2.01 %
February	101.489	2.36
March	99.449	2.90
April	96.963	3.61
May	97.414	3.49
June	96.149	3.89
July	98.326	3.25
August	96.017	3.98
September	93.139	4.96
October	93.237	4.98
November	95.626	4.20
December	111.359	3.05
Average	98.503	3.56 %

Source: Bloomberg

Union Pacific Corp.

80

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	12.0

End of Month in 2022	Price	Yield
January	99.508	2.93 %
February	97.242	3.13
March	93.679	3.46
April	85.452	4.29
May	87.048	4.13
June	83.627	4.50
July	89.281	3.91
August	83.349	4.55
September	76.256	5.39
October	75.808	5.46
November	81.413	4.79
December	104.858	1.31
Average	88.127	3.99 %

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.

80	$1,716
81	604726
	$606,442

Union Pacific Corp.

81

Type:	Notes (Exchange)
Description:	UP Corp.
CUSIP:	907818FQ6
Coupon Rate:	2.891%
Maturity Date:	4/6/2036
Amount Outstanding ($ 000)	$604,726
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	99.623	2.92 %
February	97.511	3.11
March	93.396	3.49
April	85.167	4.32
May	87.349	4.10
June	83.320	4.53
July	89.424	3.90
August	83.069	4.58
September	76.377	5.37
October	75.926	5.44
November	81.481	4.78
December	138.691	2.99
Average	90.945	4.13 %

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

81	$604,726
80	1716
	$606,442

Union Pacific Corp.

82

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818FY9
Coupon Rate:	3.375%
Maturity Date:	2/14/2042
Amount Outstanding ($ 000)	$494,933
Months Outstanding	11.0

End of Month in 2022	Price	Yield
January	Not Traded	- %
February	100.150	3.37
March	96.837	3.60
April	86.031	4.44
May	87.667	4.31
June	83.617	4.66
July	88.640	4.24
August	83.682	4.66
September	76.312	5.36
October	74.628	5.53
November	81.937	4.83
December	116.788	3.56
Average	88.754	4.41 %

Source: Bloomberg

Union Pacific Corp.

83

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FW3
Coupon Rate:	2.950%
Maturity Date:	3/10/2052
Amount Outstanding ($ 000)	$841,228
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	94.512	3.24 %
February	90.430	3.47
March	89.619	3.51
April	76.505	4.37
May	78.129	4.25
June	73.934	4.56
July	78.882	4.20
August	73.568	4.60
September	65.726	5.25
October	63.351	5.47
November	70.341	4.86
December	131.999	3.43
Average	82.250	4.27 %

Source: Bloomberg

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

Union Pacific Corp.

84

Type:	Notes (Exchange)
Description:	UP Corp.
CUSIP:	907818FN3
Coupon Rate:	2.973%
Maturity Date:	9/16/2062
Amount Outstanding ($ 000)	$713,580
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	90.626	3.40 %
February	86.860	3.59
March	86.659	3.60
April	72.043	4.48
May	73.865	4.35
June	69.466	4.66
July	74.883	4.29
August	68.784	4.71
September	60.302	5.41
October	58.696	5.56
November	67.224	4.84
December	105.288	1.30
Average	76.225	4.18 %

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

84	$713,580
85	3004
	$716,584

Union Pacific Corp.

85

Type:	Notes (Exchange)
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 2022	Price	Yield
January	91.228	3.37 %
February	86.233	3.62
March	86.176	3.63
April	72.450	4.45
May	73.339	4.39
June	69.741	4.64
July	75.040	4.28
August	69.014	4.70
September	60.179	5.42
October	58.307	5.60
November	66.861	4.86
December	116.276	3.15
Average	77.070	4.34 %

Source: Bloomberg

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

85	$3,004
84	713580
	$716,584

Union Pacific Corp.

86

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EP9
Coupon Rate:	3.000%
Maturity Date:	4/15/2027
Amount Outstanding ($ 000)	$494,909
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	104.039	2.17 %
February	102.823	2.41
March	100.125	2.97
April	96.762	3.72
May	97.857	3.48
June	96.385	3.84
July	98.986	3.23
August	96.022	3.95
September	92.330	4.91
October	91.826	5.07
November	94.312	4.45
December	107.979	1.43
Average	98.287	3.47 %

Source: Bloomberg

Union Pacific Corp.

87

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FA1
Coupon Rate:	3.150%
Maturity Date:	3/1/2024
Amount Outstanding ($ 000)	$498,996
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	103.329	1.52 %
February	102.466	1.89
March	101.046	2.58
April	99.957	3.17
May	100.440	2.89
June	99.486	3.47
July	100.027	3.13
August	99.062	3.80
September	97.942	4.68
October	97.735	4.93
November	98.421	4.46
December	112.381	1.96
Average	101.024	3.21 %

Source: Bloomberg

Union Pacific Corp.

88

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FT0
Coupon Rate:	3.200%
Maturity Date:	5/20/2041
Amount Outstanding ($ 000)	$991,380
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	100.457	3.17 %
February	97.556	3.37
March	94.637	3.59
April	84.463	4.42
May	86.069	4.28
June	82.112	4.63
July	87.253	4.19
August	82.318	4.62
September	74.890	5.35
October	73.218	5.53
November	80.272	4.83
December	104.549	1.01
Average	87.316	4.08 %

Source: Bloomberg

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

Union Pacific Corp.

89

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DY1
Coupon Rate:	3.250%
Maturity Date:	1/15/2025
Amount Outstanding ($ 000)	$349,149
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	103.991	1.85 %
February	102.806	2.23
March	100.900	2.91
April	99.722	3.36
May	100.602	3.01
June	99.515	3.45
July	100.323	3.11
August	98.770	3.80
September	96.914	4.69
October	96.497	4.95
November	97.655	4.42
December	134.972	2.86
Average	102.722	3.39 %

Source: Bloomberg

Union Pacific Corp.

90

Type:	Notes
Description:	UP Corp.
CUSIP:	907818ED6
Coupon Rate:	3.250%
Maturity Date:	8/15/2025
Amount Outstanding ($ 000)	$499,541
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	104.492	1.93 %
February	103.263	2.26
March	100.686	3.03
April	99.505	3.41
May	100.077	3.22
June	98.779	3.67
July	100.015	3.24
August	98.391	3.83
September	96.058	4.74
October	95.585	4.97
November	96.815	4.51
December	107.686	2.91
Average	100.113	3.48 %

Source: Bloomberg

Union Pacific Corp.

91

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FK9
Coupon Rate:	3.250%
Maturity Date:	2/5/2050
Amount Outstanding ($ 000)	$1,694,687
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	100.098	3.25 %
February	96.056	3.47
March	93.789	3.61
April	81.472	4.41
May	83.194	4.29
June	78.959	4.61
July	84.393	4.21
August	79.001	4.61
September	70.818	5.28
October	68.549	5.49
November	75.437	4.89
December	162.204	3.66
Average	89.498	4.32 %

Source: Bloomberg

Union Pacific Corp.

92

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EK0
Coupon Rate:	3.350%
Maturity Date:	8/15/2046
Amount Outstanding ($ 000)	$296,392
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	101.754	3.25 %
February	97.822	3.48
March	94.594	3.69
April	83.180	4.50
May	84.666	4.38
June	81.182	4.66
July	85.426	4.33
August	79.932	4.76
September	72.418	5.42
October	69.271	5.73
November	75.403	5.16
December	118.334	3.04
Average	86.999	4.37 %

Source: Bloomberg

Union Pacific Corp.

93

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EB0
Coupon Rate:	3.375%
Maturity Date:	2/1/2035
Amount Outstanding ($ 000)	$446,019
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	105.340	2.88 %
February	102.726	3.12
March	98.741	3.50
April	91.138	4.28
May	92.590	4.13
June	89.918	4.43
July	94.629	3.92
August	88.729	4.58
September	81.680	5.43
October	80.810	5.56
November	86.082	4.91
December	126.085	3.10
Average	94.872	4.15 %

Source: Bloomberg

Union Pacific Corp.

94

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818FX1
Coupon Rate:	2.800%
Maturity Date:	2/14/2032
Amount Outstanding ($ 000)	$1,235,928
Months Outstanding	11.0

End of Month in 2022	Price	Yield
January	Not Traded	- %
February	100.122	2.79
March	96.039	3.27
April	89.642	4.10
May	91.440	3.87
June	89.400	4.15
July	93.144	3.66
August	88.945	4.23
September	83.087	5.09
October	83.038	5.12
November	87.560	4.46
December	117.765	3.05
Average	92.744	3.98 %

Source: Bloomberg

Union Pacific Corp.

95

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FD5
Coupon Rate:	3.550%
Maturity Date:	8/15/2039
Amount Outstanding ($ 000)	$494,337
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	105.615	3.13 %
February	102.050	3.39
March	99.325	3.60
April	89.735	4.40
May	90.581	4.33
June	86.438	4.71
July	91.618	4.25
August	86.726	4.69
September	79.510	5.42
October	77.960	5.59
November	84.896	4.88
December	118.990	2.93
Average	92.787	4.28 %

Source: Bloomberg

Union Pacific Corp.

96

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FV5
Coupon Rate:	3.550%
Maturity Date:	5/20/2061
Amount Outstanding ($ 000)	$640,298
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	101.856	3.46 %
February	96.917	3.70
March	95.832	3.75
April	82.318	4.52
May	83.969	4.42
June	79.258	4.72
July	85.093	4.35
August	78.731	4.76
September	69.249	5.47
October	67.189	5.65
November	75.128	5.02
December	124.902	2.96
Average	86.704	4.40 %

Source: Bloomberg

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

Union Pacific Corp.

97

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EQ7
Coupon Rate:	3.600%
Maturity Date:	9/15/2037
Amount Outstanding ($ 000)	$495,595
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	106.685	3.06 %
February	103.675	3.30
March	100.470	3.56
April	91.425	4.37
May	93.461	4.18
June	89.908	4.53
July	95.633	3.99
August	88.882	4.64
September	81.205	5.46
October	80.311	5.56
November	87.354	4.80
December	105.335	2.45
Average	93.695	4.16 %

Source: Bloomberg

Union Pacific Corp.

98

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DR6
Coupon Rate:	3.646%
Maturity Date:	2/15/2024
Amount Outstanding ($ 000)	$425,346
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	103.934	1.67 %
February	103.270	1.93
March	101.821	2.64
April	100.747	3.21
May	101.049	3.01
June	100.198	3.52
July	100.561	3.27
August	99.774	3.81
September	98.651	4.68
October	98.459	4.89
November	98.486	4.95
December	116.665	3.13
Average	101.968	3.39 %

Source: Bloomberg

Union Pacific Corp.

99

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FB9
Coupon Rate:	3.700%
Maturity Date:	3/1/2029
Amount Outstanding ($ 000)	$770,287
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	107.570	2.53 %
February	106.077	2.74
March	103.264	3.17
April	98.412	3.97
May	99.426	3.80
June	97.567	4.12
July	100.782	3.57
August	97.164	4.20
September	92.562	5.07
October	92.034	5.19
November	95.983	4.44
December	102.400	2.08
Average	99.437	3.74 %

Source: Bloomberg

Union Pacific Corp.

100

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DV7
Coupon Rate:	3.750%
Maturity Date:	3/15/2024
Amount Outstanding ($ 000)	$399,123
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	104.240	1.70 %
February	103.445	2.01
March	101.688	2.85
April	101.028	3.18
May	101.395	2.94
June	100.437	3.48
July	100.690	3.31
August	100.082	3.69
September	98.707	4.68
October	98.364	5.00
November	98.796	4.72
December	Not Traded	-
Average	100.807	3.41 %

Source: Bloomberg

Union Pacific Corp.

101

Type:	Notes
Description:	UP Corp.
CUSIP:	907818ES3
Coupon Rate:	3.750%
Maturity Date:	7/15/2025
Amount Outstanding ($ 000)	$498,516
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	106.116	1.91 %
February	104.855	2.25
March	102.387	2.98
April	101.101	3.38
May	101.443	3.26
June	100.177	3.69
July	101.391	3.25
August	99.764	3.84
September	97.457	4.74
October	97.011	4.94
November	98.438	4.39
December	127.966	2.97
Average	103.176	3.47 %

Source: Bloomberg

Union Pacific Corp.

102

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FL7
Coupon Rate:	3.750%
Maturity Date:	2/5/2070
Amount Outstanding ($ 000)	$742,254
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	105.467	3.51 %
February	99.893	3.76
March	99.746	3.76
April	83.417	4.61
May	84.515	4.55
June	80.122	4.82
July	86.827	4.42
August	79.729	4.85
September	69.876	5.56
October	67.087	5.79
November	75.397	5.14
December	143.598	4.14
Average	89.640	4.58 %

Source: Bloomberg

Union Pacific Corp.

103

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EM6
Coupon Rate:	3.799%
Maturity Date:	10/1/2051
Amount Outstanding ($ 000)	$711,310
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	108.999	3.32 %
February	104.276	3.56
March	102.471	3.66
April	89.848	4.42
May	90.929	4.35
June	86.294	4.66
July	92.055	4.28
August	86.208	4.67
September	77.499	5.33
October	75.210	5.53
November	82.888	4.92
December	103.191	2.05
Average	91.656	4.23 %

Source: Bloomberg

Union Pacific Corp.

104

Type:	Notes (Exchange)
Description:	UP Corp.
CUSIP:	907818FS2
Coupon Rate:	3.799%
Maturity Date:	4/6/2071
Amount Outstanding ($ 000)	$816,735
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	106.200	3.53 %
February	100.678	3.77
March	101.060	3.75
April	83.975	4.63
May	85.584	4.54
June	80.321	4.86
July	87.356	4.44
August	80.565	4.84
September	70.586	5.56
October	67.998	5.77
November	76.708	5.10
December	104.535	1.80
Average	87.131	4.38 %

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

104	$816,735
105	7274
	$824,009

Union Pacific Corp.

105

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	12.0

End of Month in 2022	Price	Yield
January	109.696	3.39 %
February	100.180	3.79
March	100.416	3.78
April	84.367	4.61
May	83.705	4.65
June	80.678	4.83
July	86.464	4.49
August	80.781	4.83
September	70.478	5.57
October	68.069	5.77
November	76.856	5.09
December	101.776	1.21
Average	86.956	4.33 %

Source: Bloomberg

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

105	$7,274
104	816735
	$824,009

Union Pacific Corp.

106

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FG8
Coupon Rate:	3.839%
Maturity Date:	3/20/2060
Amount Outstanding ($ 000)	$1,415,676
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	107.906	3.46 %
February	102.774	3.70
March	101.563	3.76
April	86.946	4.57
May	88.968	4.44
June	84.210	4.74
July	90.610	4.35
August	84.275	4.74
September	74.629	5.43
October	71.688	5.67
November	80.053	5.03
December	109.776	2.49
Average	90.283	4.37 %

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.

106	$1,415,676
107	184
	$1,415,860

Union Pacific Corp.

107

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 2022	Price	Yield
January	108.340	3.44 %
February	102.481	3.72
March	101.675	3.76
April	87.283	4.55
May	88.053	4.50
June	84.384	4.73
July	90.514	4.35
August	84.209	4.74
September	74.222	5.46
October	71.364	5.70
November	80.027	5.03
December	Not Traded	-
Average	88.414	4.54 %

Source: Bloomberg

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

107	$184
106	1415676
	$1,415,860

Union Pacific Corp.

108

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EC8
Coupon Rate:	3.875%
Maturity Date:	2/1/2055
Amount Outstanding ($ 000)	$444,243
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	109.138	3.41 %
February	104.601	3.63
March	102.386	3.75
April	88.899	4.53
May	88.648	4.55
June	85.905	4.73
July	91.254	4.38
August	86.587	4.68
September	76.612	5.42
October	74.195	5.62
November	81.853	5.02
December	114.699	2.99
Average	92.065	4.39 %

Source: Bloomberg

Union Pacific Corp.

109

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EY0
Coupon Rate:	3.950%
Maturity Date:	9/10/2028
Amount Outstanding ($ 000)	$1,048,324
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	108.853	2.49 %
February	107.645	2.67
March	105.161	3.06
April	100.286	3.90
May	101.414	3.70
June	99.058	4.12
July	102.374	3.51
August	98.488	4.24
September	94.355	5.06
October	94.243	5.10
November	97.335	4.48
December	105.500	1.39
Average	101.226	3.64 %

Source: Bloomberg

Union Pacific Corp.

110

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FE3
Coupon Rate:	3.950%
Maturity Date:	8/15/2059
Amount Outstanding ($ 000)	$491,315
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	110.504	3.45 %
February	104.697	3.72
March	103.875	3.76
April	88.861	4.58
May	90.188	4.50
June	85.454	4.79
July	91.726	4.41
August	85.881	4.77
September	76.681	5.42
October	73.405	5.68
November	81.011	5.10
December	129.671	2.09
Average	93.496	4.36 %

Source: Bloomberg

Union Pacific Corp.

111

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EN4
Coupon Rate:	4.000%
Maturity Date:	4/15/2047
Amount Outstanding ($ 000)	$489,565
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	111.639	3.32 %
February	107.334	3.56
March	104.249	3.74
April	92.527	4.50
May	93.917	4.41
June	89.827	4.70
July	94.207	4.39
August	88.612	4.79
September	80.443	5.46
October	78.038	5.67
November	84.748	5.10
December	99.802	2.98
Average	93.779	4.39 %

Source: Bloomberg

Union Pacific Corp.

112

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EF1
Coupon Rate:	4.050%
Maturity Date:	11/15/2045
Amount Outstanding ($ 000)	$395,903
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	111.644	3.34 %
February	107.687	3.57
March	103.990	3.79
April	91.873	4.62
May	92.913	4.54
June	88.873	4.85
July	94.058	4.46
August	88.068	4.92
September	79.579	5.64
October	76.943	5.89
November	85.355	5.14
December	101.971	2.85
Average	93.580	4.47 %

Source: Bloomberg

Union Pacific Corp.

113	**Type:**	Notes
	Description:	UP Corp.
	CUSIP:	907818EJ3
	Coupon Rate:	4.050%
	Maturity Date:	3/1/2046
	Amount Outstanding ($ 000)	$515,684
	Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	112.569	3.29 %
February	107.420	3.59
March	104.991	3.73
April	93.117	4.53
May	93.513	4.50
June	91.390	4.65
July	95.566	4.35
August	89.727	4.78
September	82.280	5.39
October	78.490	5.73
November	83.922	5.26
December	102.087	1.10
Average	94.589	4.24 %

Source: Bloomberg

Union Pacific Corp.

114

Type:	Notes
Description:	UP Corp.
CUSIP:	907818ER5
Coupon Rate:	4.100%
Maturity Date:	9/15/2067
Amount Outstanding ($ 000)	$494,472
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	112.507	3.55 %
February	107.000	3.78
March	104.966	3.87
April	89.416	4.66
May	90.957	4.58
June	85.833	4.88
July	92.471	4.49
August	86.127	4.86
September	75.856	5.57
October	72.890	5.80
November	82.521	5.10
December	103.502	2.88
Average	92.004	4.50 %

Source: Bloomberg

Union Pacific Corp.

115

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DZ8
Coupon Rate:	4.150%
Maturity Date:	1/15/2045
Amount Outstanding ($ 000)	$229,005
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	112.067	3.39 %
February	107.392	3.67
March	103.712	3.90
April	92.218	4.71
May	93.727	4.60
June	89.164	4.95
July	93.842	4.59
August	87.456	5.10
September	80.370	5.72
October	77.965	5.95
November	84.340	5.37
December	97.704	3.07
Average	93.330	4.59 %

Source: Bloomberg

Union Pacific Corp.

116

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DP0
Coupon Rate:	4.250%
Maturity Date:	4/15/2043
Amount Outstanding ($ 000)	$183,566
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	110.389	3.55 %
February	108.257	3.68
March	102.683	4.06
April	92.966	4.79
May	92.819	4.80
June	89.755	5.05
July	94.785	4.64
August	88.789	5.14
September	81.860	5.77
October	80.304	5.92
November	85.909	5.40
December	111.028	2.04
Average	94.962	4.57 %

Source: Bloomberg

Union Pacific Corp.

117

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DL9
Coupon Rate:	4.300%
Maturity Date:	6/15/2042
Amount Outstanding ($ 000)	$204,353
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	111.044	3.54 %
February	109.702	3.62
March	104.012	4.01
April	95.213	4.67
May	95.180	4.67
June	91.833	4.95
July	97.032	4.53
August	91.690	4.96
September	84.579	5.60
October	83.206	5.74
November	88.982	5.21
December	122.341	3.39
Average	97.901	4.57 %

Source: Bloomberg

Union Pacific Corp.

118

Type:	Notes
Description:	UP Corp.
CUSIP:	907818FC7
Coupon Rate:	4.300%
Maturity Date:	3/1/2049
Amount Outstanding ($ 000)	$626,918
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	117.147	3.33 %
February	112.674	3.57
March	109.631	3.73
April	97.215	4.48
May	98.360	4.41
June	94.070	4.69
July	98.215	4.42
August	92.460	4.81
September	84.432	5.42
October	80.671	5.73
November	88.422	5.11
December	106.663	2.75
Average	98.330	4.37 %

Source: Bloomberg

Union Pacific Corp.

119

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EV6
Coupon Rate:	4.375%
Maturity Date:	9/10/2038
Amount Outstanding ($ 000)	$231,065
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	111.435	3.46 %
February	109.964	3.57
March	106.278	3.86
April	97.848	4.56
May	97.649	4.58
June	93.934	4.92
July	98.836	4.48
August	92.978	5.02
September	88.519	5.46
October	85.714	5.76
November	90.987	5.22
December	106.271	1.46
Average	98.368	4.36 %

Source: Bloomberg

Union Pacific Corp.

120

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EG9
Coupon Rate:	4.375%
Maturity Date:	11/15/2065
Amount Outstanding ($ 000)	$169,391
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	115.258	3.67 %
February	113.926	3.73
March	109.008	3.94
April	93.594	4.72
May	96.006	4.59
June	91.194	4.86
July	96.642	4.55
August	85.677	5.21
September	77.379	5.81
October	75.178	5.99
November	81.938	5.47
December	107.511	2.86
Average	95.276	4.62 %

Source: Bloomberg

Union Pacific Corp.

121

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EW4
Coupon Rate:	4.500%
Maturity Date:	9/10/2048
Amount Outstanding ($ 000)	$386,005
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	120.343	3.34 %
February	114.750	3.63
March	111.166	3.83
April	99.114	4.56
May	100.357	4.48
June	96.178	4.76
July	100.810	4.45
August	95.003	4.84
September	85.659	5.55
October	82.866	5.79
November	90.880	5.14
December	118.965	2.95
Average	101.341	4.44 %

Source: Bloomberg

Union Pacific Corp.

122

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DJ4
Coupon Rate:	4.750%
Maturity Date:	9/15/2041
Amount Outstanding ($ 000)	$212,549
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	117.312	3.52 %
February	117.681	3.49
March	110.456	3.97
April	98.394	4.88
May	99.847	4.76
June	95.880	5.09
July	100.824	4.68
August	96.223	5.06
September	90.023	5.61
October	86.717	5.93
November	93.067	5.34
December	125.424	3.21
Average	102.654	4.63 %

Source: Bloomberg

Union Pacific Corp.

123

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DU9
Coupon Rate:	4.750%
Maturity Date:	12/15/2043
Amount Outstanding ($ 000)	$182,761
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	116.683	3.64 %
February	112.957	3.86
March	109.006	4.12
April	98.358	4.87
May	98.822	4.84
June	95.524	5.10
July	100.614	4.70
August	95.817	5.07
September	89.279	5.62
October	87.713	5.76
November	93.776	5.24
December	101.876	1.20
Average	100.035	4.50 %

Source: Bloomberg

Union Pacific Corp.

124

Type:	Notes
Description:	UP Corp.
CUSIP:	907818EX2
Coupon Rate:	4.800%
Maturity Date:	9/10/2058
Amount Outstanding ($ 000)	$25,785
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	112.958	4.11 %
February	108.643	4.33
March	106.508	4.44
April	93.970	5.17
May	94.752	5.12
June	91.014	5.37
July	96.033	5.04
August	91.277	5.35
September	81.788	6.05
October	79.029	6.28
November	86.947	5.65
December	122.049	3.18
Average	97.081	5.01 %

Source: Bloomberg

Union Pacific Corp.

125

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DT2
Coupon Rate:	4.821%
Maturity Date:	2/1/2044
Amount Outstanding ($ 000)	$129,677
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	118.834	3.58 %
February	117.322	3.66
March	111.497	4.02
April	100.243	4.80
May	100.335	4.80
June	96.968	5.05
July	102.291	4.65
August	96.056	5.13
September	88.652	5.75
October	83.850	6.20
November	89.469	5.68
December	102.790	1.58
Average	100.692	4.58 %

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	$129,677
126	1
	$129,678

Union Pacific Corp.

126

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 2022	Price	Yield
January	117.677	3.65 %
February	113.169	3.92
March	110.274	4.10
April	99.522	4.86
May	99.935	4.83
June	96.257	5.11
July	99.004	4.90
August	96.814	5.07
September	88.432	5.77
October	85.490	6.04
November	93.035	5.38
December	115.628	3.23
Average	101.270	4.74 %

Source: Bloomberg

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

126	$1
125	129677
	$129,678

Union Pacific Corp.

127

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DX3
Coupon Rate:	4.850%
Maturity Date:	6/15/2044
Amount Outstanding ($ 000)	$83,324
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	117.433	3.70 %
February	116.103	3.78
March	111.052	4.09
April	97.783	5.02
May	97.722	5.02
June	93.860	5.33
July	97.111	5.07
August	92.152	5.47
September	86.031	6.01
October	83.076	6.29
November	87.556	5.88
December	102.251	3.05
Average	98.511	4.89 %

Source: Bloomberg

Union Pacific Corp.

128

Type:	Notes
Description:	UP Corp.
CUSIP:	907818DF2
Coupon Rate:	5.780%
Maturity Date:	7/15/2040
Amount Outstanding ($ 000)	$64,335
Months Outstanding	12.0

End of Month in 2022	Price	Yield
January	127.078	3.74 %
February	125.591	3.83
March	120.276	4.18
April	109.558	4.98
May	109.577	4.97
June	106.523	5.22
July	111.686	4.80
August	105.995	5.26
September	98.563	5.91
October	97.401	6.02
November	103.370	5.48
December	102.249	2.11
Average	109.822	4.71 %

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.

128	$64,335
129	10
	$64,345

Union Pacific Corp.

129

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 2022	Price	Yield
January	126.325	3.79 %
February	124.730	3.88
March	119.751	4.22
April	109.348	4.99
May	109.141	5.01
June	105.510	5.30
July	110.296	4.91
August	105.638	5.29
September	97.946	5.97
October	96.130	6.14
November	102.833	5.53
December	117.689	3.02
Average	110.445	4.84 %

Source: Bloomberg

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

129	$10
128	64335
	$64,345

Union Pacific Corp.

130

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818GB8
Coupon Rate:	4.500%
Maturity Date:	1/20/2033
Amount Outstanding ($ 000)	$890,049
Months Outstanding	4.0

End of Month in 2022	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	94.676	5.17
October	94.655	5.18
November	99.021	4.62
December	122.973	3.27
Average	102.831	4.56 %

Source: Bloomberg

Union Pacific Corp.

131

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818GD4
Coupon Rate:	5.150%
Maturity Date:	1/20/2063
Amount Outstanding ($ 000)	$393,074
Months Outstanding	4.0

End of Month in 2022	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	92.867	5.60
October	89.983	5.80
November	99.160	5.20
December	103.025	3.07
Average	96.259	4.92 %

Source: Bloomberg

Note: These are Medium Term Notes, referred to as Series B.

Union Pacific Corp.

132

Type:	Notes (New)
Description:	UP Corp.
CUSIP:	907818GC6
Coupon Rate:	4.950%
Maturity Date:	9/9/2052
Amount Outstanding ($ 000)	$589,946
Months Outstanding	4.0

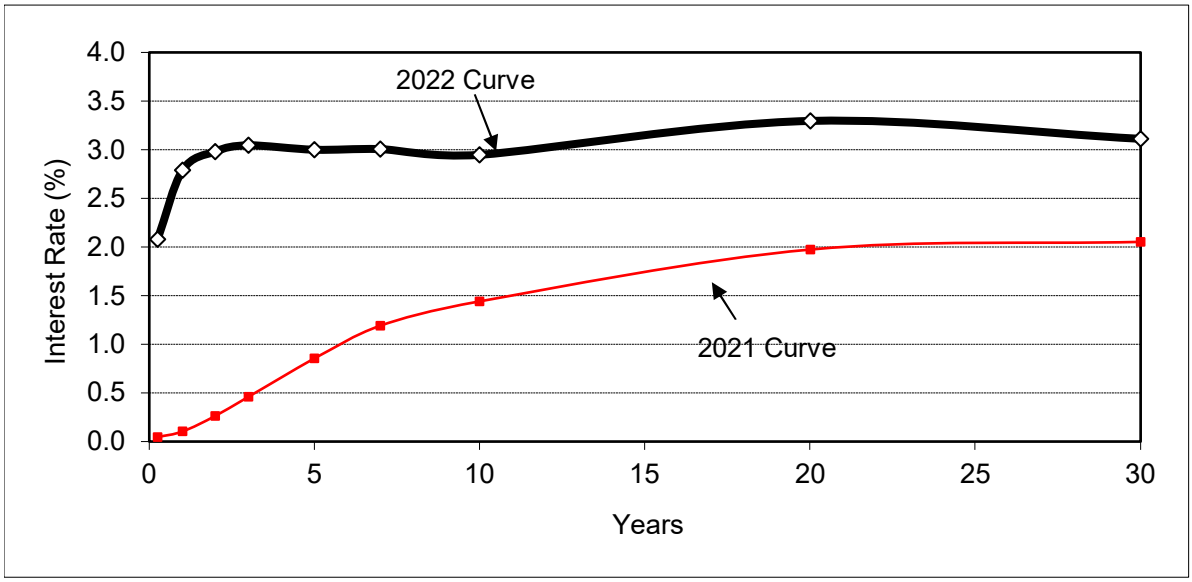
End of Month in 2022	Price	Yield
January	Not Traded	- %
February	Not Traded	-
March	Not Traded	-
April	Not Traded	-
May	Not Traded	-
June	Not Traded	-
July	Not Traded	-
August	Not Traded	-
September	93.167	5.41
October	90.587	5.60
November	98.906	5.02
December	117.176	3.07
Average	99.959	4.78 %

Source: Bloomberg

Interest Rates on Selected Government Instruments

Yield in Percent Per Annum, Constant Maturity Rates for 2022

	3 Mo.	1 Yr	2 Yr	3 Yr	5 Yr	7 Yr	10 Yr	20 Yr	30 Yr
January	0.15	0.55	0.98	1.25	1.54	1.70	1.76	2.15	2.10
February	0.31	1.00	1.44	1.65	1.81	1.91	1.93	2.31	2.25
March	0.45	1.34	1.91	2.09	2.11	2.15	2.13	2.51	2.41
April	0.76	1.89	2.54	2.72	2.78	2.80	2.75	2.99	2.81
May	0.99	2.06	2.62	2.79	2.87	2.92	2.90	3.26	3.07
June	1.54	2.65	3.00	3.15	3.19	3.21	3.14	3.48	3.25
July	2.30	3.02	3.04	3.03	2.96	2.97	2.90	3.35	3.10
August	2.72	3.28	3.25	3.23	3.03	2.98	2.90	3.35	3.13
September	3.22	3.89	3.86	3.88	3.70	3.64	3.52	3.82	3.56
October	3.87	4.43	4.38	4.38	4.18	4.09	3.98	4.28	4.04
November	4.32	4.73	4.50	4.34	4.06	3.99	3.89	4.22	4.00
December	4.36	4.68	4.29	4.05	3.76	3.72	3.62	3.87	3.66
Average	**2.08**	**2.79**	**2.98**	**3.05**	**3.00**	**3.01**	**2.95**	**3.30**	**3.12**



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

Equipment Trust Certificates for CSX

Modeled ETCs

	ETC ID	Maturity	Balance For 2022 ($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 2022 ($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 2022 ($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 2022 ($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 2022 ($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 2022 ($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 2022 ($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 2022 ($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 2022 ($000) Beg.	Ending	Avg O/S	Current Valuation Interest Rate	Valuation Factor	Current Market Value	Interest
1.	ETC UPC Series J	1/2/2031	26,139	24,027	25,083	3.711%	1.12036	28,102	1,043
2.	ETC UPC Series A	5/14/2026	378,348	361,478	369,913	3.744%	0.98658	364,949	13,663
3.	ETC UPC Series 2015 A	5/12/2027	315,133	301,714	308,424	3.744%	0.96745	298,383	11,173
4.	ETC UPC Series 2016 A	11/9/2029	123,997	118,890	121,444	3.736%	0.95139	115,540	4,316
5.					--			--	--
6.					--			--	--
7.					--			--	--
8.					--			--	--
9.					--			--	--
10.					--			--	--
11.					--			--	--
12.					--			--	--
13.					--			--	--
14.					--			--	--
15.					--			--	--
	Total		$843,617	$806,109	$824,863	**3.742%**		**$806,974**	$30,195

Non-Modeled ETCs

	ETC ID	Maturity	Balance For 2022 ($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 2022 ($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 2022 ($000) Ending
Total Modeled	$806,109
Total Non-Modeled	0
Sub Total	806,109
Total All Current	0
Grand Total	$806,109
From UP:	
Total ETCs	$806,109
Difference	$0

2022 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	$59,889,405	$591,679	$60,481,084	98.68%	100.06%
Equipment Trust Certificates	806,974		806,974	1.32%	1.34%
Conditional Sales Agreements	0		0	0.00%	0.00%
Sub Total	$60,696,379	$591,679	$61,288,058	100.00%	101.39%
All Other — Capital Leases		$242,411	$242,411	-28.84%	0.40%
All Other — Misc. Debt		-1,083,015	-1,083,015	128.84%	-1.79%
All Other — Non-Modeled ETC		0	0	0.00%	0.00%
All Other — Non-Modeled CSA		0	0	0.00%	0.00%
Sub Total			-$840,604	100.00%	-1.39%
Total Market Value			**$60,447,454**		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 99.02 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 -$840,604 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 -$840,604 thousand, or -1.4 percent of total debt.

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

2022 Flotation Costs for Bonds

	CSX Sr Notes	CSX Sr Notes	CSX Sr Notes*	NSC Sr Notes	NSC Sr Notes	NSC Sr Notes
From 424(b)	**7/21/2022**	**7/21/2022**	**7/21/2022**	**2/15/2022**	**2/15/2022**	**6/2/2022**
Face Amount	$950,000,000	$900,000,000	$150,000,000	$600,000,000	$400,000,000	$750,000,000
Coupon Rate	4.100%	4.500%	4.650%	3.000%	3.700%	4.550%
Maturity Date	11/15/2032	11/15/2052	3/1/2068	3/15/2032	3/15/2053	6/1/2053
Frequency of Coupon Payment	2	2	2	2	2	2
Interest Accrual Date	7/28/2022	7/28/2022	3/1/2022	9/15/2022	9/15/2022	12/1/2022
Price To Investors	99.938	99.351	95.63	99.999	99.412	99.985
Proceeds from Sale (before expenses)	$949,411,000	$894,159,000	$143,445,000	$599,994,000	$397,648,000	$749,887,500
Underwriter Fee as % of Gross Proceeds	0.650%	0.875%	0.875%	0.650%	0.875%	0.875%
Underwriter's Fee	$6,175,000	$7,875,000	$1,312,500	$3,900,000	$3,500,000	$6,562,500
Railroad Expenses Excluding Fee	$166,250.00	$157,500.00	$26,250.00	$1,080,000.00	$720,000.00	$1,400,000.00
Page in 424(b) for Expenses	S-24	S-24	S-24	S-15	S-15	S-15
Calculated						
Yield Based on Price to Investors	4.107%	4.539%	4.890%	3.000%	3.732%	4.551%
Issue Price Per $100 Less Flotation	$99.27	$98.46	$94.74	$99.17	$98.36	$98.92
Yield on New Issue Including Flotation	4.187%	4.594%	4.941%	3.102%	3.791%	4.616%
Flotation Costs (Diff. in Pct Pts)	**0.080%**	**0.055%**	**0.051%**	**0.102%**	**0.059%**	**0.065%**
Avg. Flotation Cost (Pct. Points) (includes costs on page 2)	**0.064%**					
Previous Year's Average	0.060%					

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.

* The 2068 CSX Sr Notes are a further issuance of the 4.650% senior notes issued February 2018 (Appendix E Page 1 2018 year filing).

2022 Flotation Costs for Bonds

	UNP Sr Notes	UNP Sr Notes	UNP Sr Notes	UNP Sr Notes	UNP Sr Notes	UNP Sr Notes	UNP Sr Notes
From 424(b)	**2/9/2022**	**2/9/2022**	**2/9/2022**	**2/9/2022**	**9/6/2022**	**9/6/2022**	**9/6/2022**
Face Amount	$1,250,000,000	$500,000,000	$1,250,000,000	$500,000,000	$900,000,000	$600,000,000	$400,000,000
Coupon Rate	2.800%	3.375%	3.500%	3.850%	4.500%	4.950%	5.150%
Maturity Date	2/14/2032	2/14/2042	2/14/2053	2/14/2072	1/20/2033	9/9/2052	1/20/2063
Frequency of Coupon Payment	2	2	2	2	2	2	2
Interest Accrual Date	8/14/2022	8/14/2022	8/14/2022	8/14/2022	1/20/2023	3/9/2023	1/20/2023
Price To Investors	99.593	99.87	99.774	99.735	99.661	99.335	99.283
Proceeds from Sale (before expenses)	$1,244,912,500	$499,350,000	$1,247,175,000	$498,675,000	$896,949,000	$596,010,000	$397,132,000
Underwriter Fee as % of Gross Proceeds	0.650%	0.750%	0.875%	0.875%	0.650%	0.875%	0.875%
Underwriter's Fee	$8,125,000	$3,750,000	$10,937,500	$4,375,000	$5,850,000	$5,250,000	$3,500,000
Railroad Expenses Excluding Fee	$160,714.29	$64,285.71	$160,714.29	$64,285.71	$213,157.89	$142,105.26	$94,736.84
Page in 424(b) for Expenses	S-12	S-12	S-12	S-12	S-16	S-16	S-16
Calculated							
Yield Based on Price to Investors	2.849%	3.384%	3.512%	3.862%	4.543%	4.993%	5.193%
Issue Price Per $100 Less Flotation	$98.93	$99.11	$98.89	$98.85	$98.99	$98.44	$98.38
Yield on New Issue Including Flotation	2.930%	3.438%	3.560%	3.903%	4.628%	5.053%	5.247%
Flotation Costs (Diff. in Pct Pts)	**0.081%**	**0.054%**	**0.048%**	**0.041%**	**0.085%**	**0.059%**	**0.054%**

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

Example of Source for Bond Flotation Costs

Filed Pursuant to Rule 424(b)(5)
Registration Statement No. 333-252947

Prospectus Supplement (To Prospectus Dated February 10, 2021)

$ 1,900,000,000

BUILDING AMERICA®

$900,000,000 4.500% Notes due 2033
$600,000,000 4.950% Notes due 2052
$400,000,000 5.150% Notes due 2063

Union Pacific Corporation (the "*Company*" or "*Union Pacific*") is offering $900,000,000 aggregate principal amount of 4.500% notes due 2033 (the "*2033 notes*"), $600,000,000 aggregate principal amount of 4.950% notes due 2052 (the "*2052 notes*" or the "*green notes*") and $400,000,000 aggregate principal amount of 5.150% notes due 2063 (the "*2063 notes*" and, collectively with the 2033 notes and the 2052 notes, the "*notes*"). The 2033 notes will mature on January 20, 2033, the 2052 notes will mature on September 9, 2052 and the 2063 notes will mature on January 20, 2063.

We will pay interest on the 2033 notes semi-annually in arrears on each January 20 and July 20, commencing January 20, 2023. We will pay interest on the 2052 notes semi-annually in arrears on each September 9 and March 9, commencing March 9, 2023. We will pay interest on the 2063 notes semi-annually in arrears on each January 20 and July 20, commencing January 20, 2023.

We may redeem some or all of each series of notes at any time and from time to time at the applicable redemption prices described in this prospectus supplement under the heading "Description of the Notes—Optional Redemption." There is no sinking fund for the notes. If we experience a change of control repurchase event, we may be required to offer to purchase the notes from holders. See "Description of the Notes—Change of Control Repurchase Event."

There is currently no market for the notes offered hereby, and we cannot assure you that a market for the notes will develop. We do not intend to list the notes on any national securities exchange.

Investing in our notes involves risks. See "Risk Factors" beginning on page S-2 of this prospectus supplement and on page 2 of the accompanying prospectus.

	Price to Public(1)	Underwriting Discount	Proceeds to the Company before expenses(1)
Per 2033 note	99.661%	0.650%	99.011%
Total	$896,949,000	$ 5,850,000	$ 891,099,000
Per 2052 note	99.335%	0.875%	98.460%
Total	$596,010,000	$ 5,250,000	$ 590,760,000
Per 2063 note	99.283%	0.875%	98.408%
Total	$397,132,000	$ 3,500,000	$ 393,632,000

(1) Plus accrued interest from September 9, 2022, if any.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of 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.

Delivery of the notes, in book-entry form only through The Depository Trust Company ("*DTC*" or the "*Depository*"), will be made on or about September 9, 2022. Beneficial interests in the notes will be shown on, and transfers thereof will be effected only through, records maintained by DTC and its direct and indirect participants, including Clearstream Banking, *société anonyme*, and Euroclear Bank S.A./N.V., as operator of the Euroclear system.

Joint Book-Running Managers

BofA Securities — *Green Structuring Agent*
Barclays
US Bancorp
Wells Fargo Securities

Senior Co-Managers

Citigroup
Credit Suisse
J.P. Morgan
Morgan Stanley

Co-Managers

Example of Source for Bond Flotation Costs

We estimate that our out-of-pocket expenses (excluding the underwriting discounts) for this offering will be approximately $450,000.

Each series of notes is a new issue of securities with no established trading market. We do not intend to apply for the notes to be listed on any securities exchange or to arrange for the notes to be quoted on any quotation system. The underwriters intend to make a secondary market for the notes. However, they are not obligated to do so and may discontinue making a secondary market for the notes at any time without notice. No assurance can be given as to how liquid the trading market for the notes will be.

We have agreed to indemnify the several underwriters against liabilities under the Securities Act of 1933, as amended, or contribute to payments which the underwriters may be required to make in that respect.

In connection with the offering, the underwriters may engage in stabilizing transactions, syndicate covering transactions and penalty bids in accordance with Regulation M under the Exchange Act.

- Stabilizing transactions permit bids to purchase the underlying security so long as the stabilizing bids do not exceed a specified maximum.
- Over-allotment involves sales by the underwriters of the notes in excess of the principal amount of the notes the underwriters are obligated to purchase, which creates a syndicate short position.
- Syndicate covering transactions involve purchases of the notes in the open market after the distribution has been completed in order to cover syndicate short positions. 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.
- Penalty bids permit the representatives to reclaim a selling concession from a syndicate member when the notes originally sold by the syndicate member are purchased in a stabilizing transaction or a syndicate covering transaction to cover syndicate short positions.

These stabilizing transactions, syndicate covering transactions and penalty bids may have the effect of raising or maintaining the market price of the notes or preventing or retarding a decline in the market price of the notes. As a result, the price of the notes may be higher than the price that might otherwise exist in the open market. These transactions, if commenced, may be discontinued at any time without notice.

In the ordinary course of business, certain of the underwriters and their respective affiliates have from time to time performed and may in the future perform various financial advisory, commercial banking, corporate trust and investment banking services for us and our subsidiaries, for which they received or will receive customary fees.

Affiliates of BofA Securities, Inc., Barclays Capital Inc., U.S. Bancorp Investments, Inc. and Wells Fargo Securities, LLC and affiliates of certain other underwriters are lenders under our $2.0 billion revolving credit facility that expires in June 2023. Affiliates of BofA Securities, Inc., Barclays Capital Inc. and Wells Fargo Securities, and affiliates of certain other underwriters assist us from time to time in executing our share repurchase program.

In addition, in the ordinary course of their business activities, the underwriters and their affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for their own account and for the accounts of their customers. Such investments and securities activities may involve securities and/or instruments of ours or our affiliates. If any of the underwriters or their affiliates has a lending relationship with us, certain of those underwriters or their affiliates routinely hedge, and certain other of those underwriters or their affiliates may hedge, their credit exposure to us consistent with their customary risk management policies. Typically, such underwriters and their affiliates would hedge such exposure by entering into transactions which consist of either the purchase of credit

2022 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	98.68%	4.220%	4.164%
Equipment Trust Certificates	App. C & Table 5	1.32%	3.742%	0.049%
Conditional Sales Agreements	Railroad Data	0.00%	--	--
Total Without Floatation Costs		100.00%		4.214%
Floatation Costs				
Bonds, Notes & Debentures	App. F & Table 8	98.68%	0.064%	0.063%
Equipment Trust Certificates	Tables 7 and 8	1.32%	0.078%	0.001%
Conditional Sales Agreements	Table 8	0.00%	not	--
Total Floatation Costs		100.00%		0.064%
Weighted Cost of Debt				4.278%
Weighted Cost of Debt (rounded)				**4.28%**

Historical Weighted Cost of Debt (for comparison purposes only)

Item	Year	Reference	Weighted Cost
Previous Year	2021	EP 558 (Sub-No. 25) Served August 2, 2022	2.63%
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 3-14-2023

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 7, 2022	37.51	2,217,983,411	83,196,558
Friday, January 14, 2022	36.44	2,217,983,411	80,823,315
Friday, January 21, 2022	34.10	2,217,983,411	75,633,234
Friday, January 28, 2022	34.43	2,217,983,411	76,365,169
Friday, February 4, 2022	34.30	2,193,389,444	75,233,258
Friday, February 11, 2022	33.37	2,193,389,444	73,193,406
Friday, February 18, 2022	34.66	2,193,389,444	76,022,878
Friday, February 25, 2022	34.31	2,193,389,444	75,255,192
Friday, March 4, 2022	37.43	2,193,389,444	82,098,567
Friday, March 11, 2022	34.69	2,193,389,444	76,088,680
Friday, March 18, 2022	36.31	2,193,389,444	79,641,971
Friday, March 25, 2022	36.92	2,193,389,444	80,979,938
Friday, April 1, 2022	35.51	2,174,259,952	77,207,971
Friday, April 8, 2022	34.33	2,174,259,952	74,642,344
Thursday, April 14, 2022	35.06	2,174,259,952	76,229,554
Friday, April 22, 2022	34.52	2,174,259,952	75,055,454
Friday, April 29, 2022	34.34	2,174,259,952	74,664,087
Friday, May 6, 2022	34.78	2,174,259,952	75,620,761
Friday, May 13, 2022	33.43	2,174,259,952	72,685,510
Friday, May 20, 2022	30.94	2,174,259,952	67,271,603
Friday, May 27, 2022	32.05	2,174,259,952	69,685,031
Friday, June 3, 2022	32.11	2,174,259,952	69,815,487
Friday, June 10, 2022	30.30	2,174,259,952	65,880,077
Friday, June 17, 2022	28.93	2,174,259,952	62,901,340
Friday, June 24, 2022	29.57	2,174,259,952	64,292,867
Friday, July 1, 2022	29.34	2,141,241,136	62,824,015
Friday, July 8, 2022	28.99	2,141,241,136	62,074,581
Friday, July 15, 2022	28.86	2,141,241,136	61,796,219
Friday, July 22, 2022	30.89	2,141,241,136	66,142,939
Friday, July 29, 2022	32.33	2,141,241,136	69,226,326
Friday, August 5, 2022	33.11	2,141,241,136	70,896,494
Friday, August 12, 2022	34.35	2,141,241,136	73,551,633
Friday, August 19, 2022	33.83	2,141,241,136	72,438,188
Friday, August 26, 2022	32.63	2,141,241,136	69,868,698
Friday, September 2, 2022	31.24	2,141,241,136	66,892,373
Friday, September 9, 2022	32.63	2,141,241,136	69,868,698
Friday, September 16, 2022	29.49	2,141,241,136	63,145,201
Friday, September 23, 2022	27.68	2,141,241,136	59,269,555
Friday, September 30, 2022	26.64	2,102,408,729	56,008,169
Friday, October 7, 2022	26.77	2,102,408,729	56,281,482
Friday, October 14, 2022	27.31	2,102,408,729	57,416,782
Friday, October 21, 2022	27.54	2,102,408,729	57,900,336
Friday, October 28, 2022	29.22	2,102,408,729	61,432,383
Friday, November 4, 2022	29.63	2,102,408,729	62,294,371
Friday, November 11, 2022	31.94	2,102,408,729	67,150,935
Friday, November 18, 2022	30.88	2,102,408,729	64,922,382
Friday, November 25, 2022	32.02	2,102,408,729	67,319,128
Friday, December 2, 2022	32.05	2,102,408,729	67,382,200
Friday, December 9, 2022	31.42	2,102,408,729	66,057,682
Friday, December 16, 2022	31.65	2,102,408,729	66,541,236
Friday, December 23, 2022	31.25	2,102,408,729	65,700,273
Friday, December 30, 2022	30.98	2,102,408,729	65,132,622

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

Market Value for Common Equity

NSC Data from Bloomberg 3-14-2023

End of Wk. Date	End of Wk Close	Shares Outstanding	Capitalization ($000)
Friday, January 7, 2022	296.81	243,344,509	72,227,084
Friday, January 14, 2022	288.28	243,344,509	70,151,355
Friday, January 21, 2022	276.42	243,344,509	67,265,289
Friday, January 28, 2022	271.99	243,344,509	66,187,273
Friday, February 4, 2022	270.42	239,777,444	64,840,616
Friday, February 11, 2022	267.21	239,777,444	64,070,931
Friday, February 18, 2022	270.22	239,777,444	64,792,661
Friday, February 25, 2022	260.43	239,777,444	62,445,240
Friday, March 4, 2022	284.57	239,777,444	68,233,467
Friday, March 11, 2022	267.34	239,777,444	64,102,102
Friday, March 18, 2022	274.83	239,777,444	65,898,035
Friday, March 25, 2022	283.36	239,777,444	67,943,337
Friday, April 1, 2022	265.84	238,332,514	63,358,316
Friday, April 8, 2022	258.15	238,332,514	61,525,538
Thursday, April 14, 2022	263.06	238,332,514	62,695,751
Friday, April 22, 2022	258.59	238,332,514	61,630,405
Friday, April 29, 2022	257.88	238,332,514	61,461,189
Friday, May 6, 2022	255.74	238,332,514	60,951,157
Friday, May 13, 2022	249.32	238,332,514	59,421,062
Friday, May 20, 2022	228.86	238,332,514	54,544,779
Friday, May 27, 2022	241.03	238,332,514	57,445,286
Friday, June 3, 2022	244.66	238,332,514	58,310,433
Friday, June 10, 2022	229.36	238,332,514	54,663,945
Friday, June 17, 2022	221.47	238,332,514	52,783,502
Friday, June 24, 2022	230.43	238,332,514	54,918,961
Friday, July 1, 2022	228.55	234,873,651	53,680,373
Friday, July 8, 2022	226.20	234,873,651	53,128,420
Friday, July 15, 2022	227.89	234,873,651	53,525,356
Friday, July 22, 2022	243.10	234,873,651	57,097,785
Friday, July 29, 2022	251.17	234,873,651	58,993,215
Friday, August 5, 2022	251.02	234,873,651	58,957,984
Friday, August 12, 2022	261.84	234,873,651	61,499,317
Friday, August 19, 2022	255.75	234,873,651	60,068,936
Friday, August 26, 2022	252.99	234,873,651	59,420,685
Friday, September 2, 2022	239.26	234,873,651	56,195,870
Friday, September 9, 2022	249.85	234,873,651	58,683,182
Friday, September 16, 2022	233.98	234,873,651	54,955,737
Friday, September 23, 2022	217.65	234,873,651	51,120,250
Friday, September 30, 2022	209.65	231,514,213	48,536,955
Friday, October 7, 2022	214.57	231,514,213	49,676,005
Friday, October 14, 2022	213.49	231,514,213	49,425,969
Friday, October 21, 2022	208.04	231,514,213	48,164,217
Friday, October 28, 2022	229.14	231,514,213	53,049,167
Friday, November 4, 2022	233.80	231,514,213	54,128,023
Friday, November 11, 2022	250.91	231,514,213	58,089,231
Friday, November 18, 2022	246.76	231,514,213	57,128,447
Friday, November 25, 2022	252.32	231,514,213	58,415,666
Friday, December 2, 2022	254.07	231,514,213	58,820,816
Friday, December 9, 2022	244.05	231,514,213	56,501,044
Friday, December 16, 2022	250.60	231,514,213	58,017,462
Friday, December 23, 2022	247.50	231,514,213	57,299,768
Friday, December 30, 2022	246.42	231,514,213	57,049,732

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

Market Value for Common Equity

UNP Data from Bloomberg 3-14-2023

End of Wk. Date	End of Wk Close	Shares Outstanding	Capitalization ($000)
Friday, January 7, 2022	254.78	642,875,700	163,791,871
Friday, January 14, 2022	246.27	642,875,700	158,320,999
Friday, January 21, 2022	246.33	642,875,700	158,359,571
Friday, January 28, 2022	245.93	636,898,957	156,632,560
Friday, February 4, 2022	242.39	636,898,957	154,377,938
Friday, February 11, 2022	238.81	636,898,957	152,097,840
Friday, February 18, 2022	251.19	636,898,957	159,982,649
Friday, February 25, 2022	246.41	636,898,957	156,938,272
Friday, March 4, 2022	264.63	636,898,957	168,542,571
Friday, March 11, 2022	261.52	636,898,957	166,561,815
Friday, March 18, 2022	261.32	636,898,957	166,434,435
Friday, March 25, 2022	273.38	636,898,957	174,115,437
Friday, April 1, 2022	259.96	636,898,957	165,568,253
Friday, April 8, 2022	241.98	636,898,957	154,116,810
Thursday, April 14, 2022	246.21	636,898,957	156,810,892
Friday, April 22, 2022	234.30	628,025,156	147,146,294
Friday, April 29, 2022	234.29	628,025,156	147,140,014
Friday, May 6, 2022	229.59	628,025,156	144,188,296
Friday, May 13, 2022	230.76	628,025,156	144,923,085
Friday, May 20, 2022	213.58	628,025,156	134,133,613
Friday, May 27, 2022	222.50	628,025,156	139,735,597
Friday, June 3, 2022	224.00	628,025,156	140,677,635
Friday, June 10, 2022	211.12	628,025,156	132,588,671
Friday, June 17, 2022	206.45	628,025,156	129,655,793
Friday, June 24, 2022	215.78	628,025,156	135,515,268
Friday, July 1, 2022	215.26	624,478,594	134,425,262
Friday, July 8, 2022	209.70	624,478,594	130,953,161
Friday, July 15, 2022	209.13	624,478,594	130,597,208
Friday, July 22, 2022	213.40	624,478,594	133,263,732
Friday, July 29, 2022	227.30	624,478,594	141,943,984
Friday, August 5, 2022	228.62	624,478,594	142,768,296
Friday, August 12, 2022	239.95	624,478,594	149,843,639
Friday, August 19, 2022	238.52	624,478,594	148,950,634
Friday, August 26, 2022	231.27	624,478,594	144,423,164
Friday, September 2, 2022	223.94	624,478,594	139,845,736
Friday, September 9, 2022	231.88	624,478,594	144,804,096
Friday, September 16, 2022	212.00	624,478,594	132,389,462
Friday, September 23, 2022	203.97	624,478,594	127,374,899
Friday, September 30, 2022	194.82	614,800,800	119,775,492
Friday, October 7, 2022	195.62	614,800,800	120,267,332
Friday, October 14, 2022	193.79	614,800,800	119,142,247
Friday, October 21, 2022	190.53	614,800,800	117,137,996
Friday, October 28, 2022	198.65	614,800,800	122,130,179
Friday, November 4, 2022	196.70	614,800,800	120,931,317
Friday, November 11, 2022	217.50	614,800,800	133,719,174
Friday, November 18, 2022	210.58	614,800,800	129,464,752
Friday, November 25, 2022	213.33	614,800,800	131,155,455
Friday, December 2, 2022	214.73	614,800,800	132,016,176
Friday, December 9, 2022	211.35	614,800,800	129,938,149
Friday, December 16, 2022	210.21	614,800,800	129,237,276
Friday, December 23, 2022	209.91	614,800,800	129,052,836
Friday, December 30, 2022	207.07	614,800,800	127,306,802

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 3, 2022	Friday, January 7, 2022	$319,215,512	
2.	Monday, January 10, 2022	Friday, January 14, 2022	$309,295,669	
3.	Tuesday, January 18, 2022	Friday, January 21, 2022	$301,258,095	Martin Luther King Day
4.	Monday, January 24, 2022	Friday, January 28, 2022	$299,185,002	
5.	Monday, January 31, 2022	Friday, February 4, 2022	$294,451,813	
6.	Monday, February 7, 2022	Friday, February 11, 2022	$289,362,176	
7.	Monday, February 14, 2022	Friday, February 18, 2022	$300,798,188	
8.	Tuesday, February 22, 2022	Friday, February 25, 2022	$294,638,704	Washington's Birthday
9.	Monday, February 28, 2022	Friday, March 4, 2022	$318,874,605	
10.	Monday, March 7, 2022	Friday, March 11, 2022	$306,752,597	
11.	Monday, March 14, 2022	Friday, March 18, 2022	$311,974,441	
12.	Monday, March 21, 2022	Friday, March 25, 2022	$323,038,712	
13.	Monday, March 28, 2022	Friday, April 1, 2022	$306,134,539	
14.	Monday, April 4, 2022	Friday, April 8, 2022	$290,284,692	
15.	Monday, April 11, 2022	Thursday, April 14, 2022	$295,736,197	Good Friday
16.	Monday, April 18, 2022	Friday, April 22, 2022	$283,832,152	
17.	Monday, April 25, 2022	Friday, April 29, 2022	$283,265,289	
18.	Monday, May 2, 2022	Friday, May 6, 2022	$280,760,214	
19.	Monday, May 9, 2022	Friday, May 13, 2022	$277,029,658	
20.	Monday, May 16, 2022	Friday, May 20, 2022	$255,949,995	
21.	Monday, May 23, 2022	Friday, May 27, 2022	$266,865,915	
22.	Tuesday, May 31, 2022	Friday, June 3, 2022	$268,803,555	Memorial Day
23.	Monday, June 6, 2022	Friday, June 10, 2022	$253,132,693	
24.	Monday, June 13, 2022	Friday, June 17, 2022	$245,340,636	
25.	Monday, June 20, 2022	Friday, June 24, 2022	$254,727,096	
26.	Monday, June 27, 2022	Friday, July 1, 2022	$250,929,650	
27.	Tuesday, July 5, 2022	Friday, July 8, 2022	$246,156,162	Independence Day
28.	Monday, July 11, 2022	Friday, July 15, 2022	$245,918,784	
29.	Monday, July 18, 2022	Friday, July 22, 2022	$256,504,455	
30.	Monday, July 25, 2022	Friday, July 29, 2022	$270,163,525	
31.	Monday, August 1, 2022	Friday, August 5, 2022	$272,622,774	
32.	Monday, August 8, 2022	Friday, August 12, 2022	$284,894,588	
33.	Monday, August 15, 2022	Friday, August 19, 2022	$281,457,758	
34.	Monday, August 22, 2022	Friday, August 26, 2022	$273,712,548	
35.	Monday, August 29, 2022	Friday, September 2, 2022	$262,933,979	
36.	Tuesday, September 6, 2022	Friday, September 9, 2022	$273,355,976	Labor Day
37.	Monday, September 12, 2022	Friday, September 16, 2022	$250,490,400	
38.	Monday, September 19, 2022	Friday, September 23, 2022	$237,764,704	
39.	Monday, September 26, 2022	Friday, September 30, 2022	$224,320,615	
40.	Monday, October 3, 2022	Friday, October 7, 2022	$226,224,819	
41.	Monday, October 10, 2022	Friday, October 14, 2022	$225,984,999	
42.	Monday, October 17, 2022	Friday, October 21, 2022	$223,202,550	
43.	Monday, October 24, 2022	Friday, October 28, 2022	$236,611,729	
44.	Monday, October 31, 2022	Friday, November 4, 2022	$237,353,711	
45.	Monday, November 7, 2022	Friday, November 11, 2022	$258,959,340	
46.	Monday, November 14, 2022	Friday, November 18, 2022	$251,515,581	
47.	Monday, November 21, 2022	Friday, November 25, 2022	$256,890,248	
48.	Monday, November 28, 2022	Friday, December 2, 2022	$258,219,192	
49.	Monday, December 5, 2022	Friday, December 9, 2022	$252,496,875	
50.	Monday, December 12, 2022	Friday, December 16, 2022	$253,795,974	
51.	Monday, December 19, 2022	Friday, December 23, 2022	$252,052,876	
52.	Tuesday, December 27, 2022	Friday, December 30, 2022	$249,489,156	Christmas Day
	Average		**$270,090,982.95**	

Market Value for Common Equity

List of U.S. Stock Market Full-Day Holidays in 2022

	Day	Holiday
1.	Monday, January 17, 2022	Martin Luther King Jr. Day
2.	Monday, February 21, 2022	Washington's Birthday
3.	Friday, April 15, 2022	Good Friday
4.	Monday, May 30, 2022	Memorial Day
5.	Monday, July 4, 2022	Independence Day
6.	Monday, September 5, 2022	Labor Day
7.	Thursday, November 24, 2022	Thanksgiving Day
8.	Monday, December 26, 2022	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.

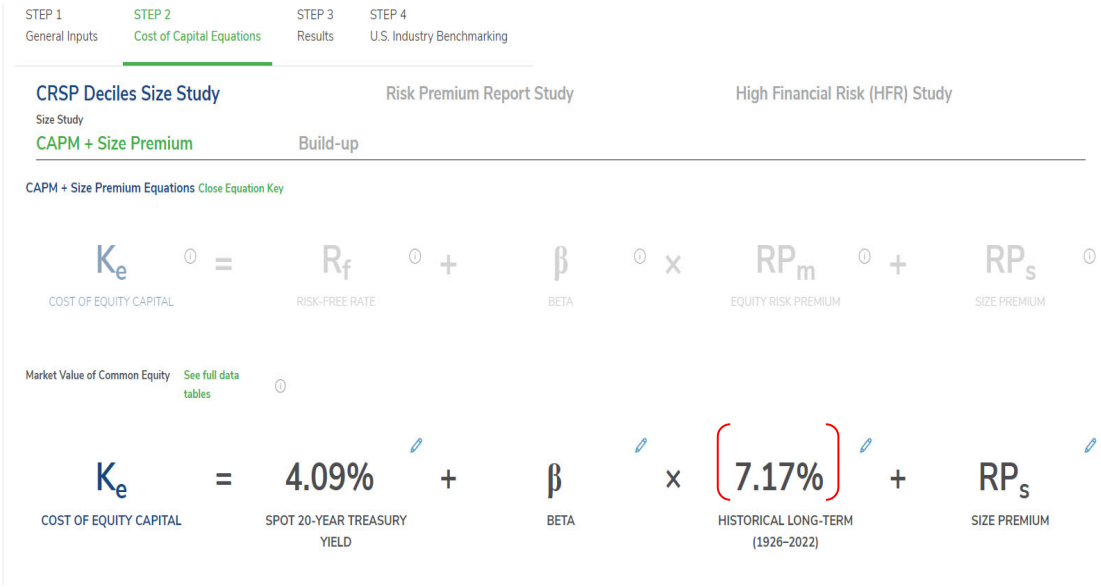
Year	Risk-Free Rate	Market Risk Premium
1980	11.36 %	7.60 %
1981	13.72	7.20
1982	12.92	7.20
1983	11.34	7.30
1984	12.49	7.10
1985	10.97	7.30
1986	7.84	7.40
1987	n.a.	7.20
1988	n.a.	7.20
1989	n.a.	7.50
1990	n.a.	7.20
1991	n.a.	7.40
1992	n.a.	7.30
1993	6.29	7.20
1994	7.49	7.00
1995	6.95	7.40
1996	6.83	7.50
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
2022	3.30	7.17

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 2017-2022 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 2023 *Cost of Capital Navigator*.The latest long-term equity risk premium, as shown below, is **7.17 percent**. The years used for this calculation are 1926 through 2022.



AAR Regression for 2022 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	0.0010734401	0.00144904	0.74	0.4595
ZSP5	0.9945754994	0.05067762	19.63	<.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]

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

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
	2018	2019	2020	2021	2022	
($ in millions)						
Revenue	12,250	11,937	10,583	12,522	14,853	62,145
Net Income	3,309	3,331	2,765	3,781	4,166	17,352
Extraordinary Items	0	0	0	0	0	0
Depreciation	1,331	1,349	1,383	1,420	1,500	6,983
Deferred Taxes	279	273	180	167	117	1,016
Capital Expenditures	1,745	1,657	1,626	1,791	2,133	8,952
Cash Flow	3,174	3,296	2,702	3,577	3,650	16,399
Cash Flow / Revenue	0.25910	0.27612	0.25532	0.28566	0.24574	0.26388
NIBEI / Revenue	0.27012	0.27905	0.26127	0.30195	0.28048	0.27922

Ibbotson Smoothed Cash Flow = $14,853 x 0.26388 = $3,919.45
Ibbotson Smoothed Net Income BEI = $14,853 x 0.27922 = $4,147.22

Cash Flow Calculation

Norfolk Southern	1 2018	2 2019	3 2020	4 2021	5 2022	Total
($ in millions)						
Revenue	11,458	11,296	9,789	11,142	12,745	56,430
Net Income	2,666	2,722	2,013	3,005	3,270	13,676
Extraordinary Items	0	0	0	0	0	0
Depreciation	1,104	1,139	1,154	1,181	1,221	5,799
Deferred Taxes	173	330	142	184	83	912
Capital Expenditures	1,951	2,019	1,494	1,470	1,948	8,882
Cash Flow	1,992	2,172	1,815	2,900	2,626	11,505
Cash Flow / Revenue	0.17385	0.19228	0.18541	0.26028	0.20604	0.20388
NIBEI / Revenue	0.23268	0.24097	0.20564	0.26970	0.25657	0.24235

Ibbotson Smoothed Cash Flow = $12,745 x 0.20388 = $2,598.46
Ibbotson Smoothed Net Income BEI = $12,745 x 0.24235 = $3,088.79

Cash Flow Calculation

Union Pacific Corp.	1 2018	2 2019	3 2020	4 2021	5 2022	Total
($ in millions)						
Revenue	22,832	21,708	19,533	21,804	24,875	110,752
Net Income	5,966	5,919	5,349	6,523	6,998	30,755
Extraordinary Items	0	0	0	0	0	0
Depreciation	2,191	2,216	2,210	2,208	2,246	11,071
Deferred Taxes	338	566	340	154	262	1,660
Capital Expenditures	3,437	3,453	2,927	2,936	3,620	16,373
Cash Flow	5,058	5,248	4,972	5,949	5,886	27,113
Cash Flow / Revenue	0.22153	0.24175	0.25454	0.27284	0.23662	0.24481
NIBEI / Revenue	0.26130	0.27266	0.27384	0.29917	0.28133	0.27769

Ibbotson Smoothed Cash Flow = $24,875 x 0.24481 = $6,089.60
Ibbotson Smoothed Net Income BEI = $24,875 x 0.27769 = $6,907.60

2022 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	10.40	13.01	12.10	11.58	--	--	--	--	**11.84**
NSC	9.96	9.40	7.60	--	--	--	--	--	**9.40**
UNP	10.70	6.82	9.60	--	--	--	--	--	**9.60**

Simple Average of Medians = 10.28 percent.

2022 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	4	11.77	13.01	10.40
Filtered/Preliminary Mean**:	1	10.40	10.40	10.40
30 Day Ago Mean	4	11.90	13.01	10.40

* Only selected brokers below are included in the filtered mean

	12/2021\	3/2022\	6/2022\	9/2022\	12/2021A
Reported	0.42	0.39	0.54	0.51	1.55
Surprise Mean	0.41	0.37	0.47	0.49	1.55
Surprise (%)	1.45	4.44	14.94	3.39	0.12

Check / Uncheck	Contributor	Analyst	Current Estimate	Current Estimate Date	Previous Estimate	Previous Estimate Date	Review Date
✔	Permission Denied 32	Permission Denied	10.40 ↑	Dec 01, 22	9.50	Oct 13, 22	Dec 01, 22
	CREDIT SUISSE	Rosa, Ariel L	13.01 ↓	Oct 21, 22	13.02	Oct 10, 22	Nov 17, 22
	Permission Denied 398136	Permission Denied	12.10 ↑	Nov 29, 22	11.30	Oct 20, 22	Nov 29, 22
	Permission Denied 392	Permission Denied	11.58 ↓	Dec 15, 22	12.10	Nov 28, 22	Dec 19, 22

2022 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	8.99	9.96	7.60
Filtered/Preliminary Mean**:	1	9.96	9.96	9.96
30 Day Ago Mean	3	8.99	9.96	7.60

* Only selected brokers below are included in the filtered mean

	12/2021\	3/2022\	6/2022\	9/2022\	12/2021A
Reported	3.12	2.93	3.45	4.10	12.11
Surprise Mean	3.04	2.92	3.47	3.64	12.00
Surprise (%)	2.70	0.40	-0.53	12.77	0.88

Check / Uncheck	Contributor	Analyst	Current Estimate	Current Estimate Date	Previous Estimate	Previous Estimate Date	Review Date
✓	CREDIT SUISSE	Rosa, Ariel L	9.96 ↓	Nov 21, 22	11.96	Oct 26, 22	Nov 21, 22
	Permission Denied 32	Permission Denied	9.40 ↑	Oct 26, 22	9.00	Oct 13, 22	Oct 26, 22
	Permission Denied 398136	Permission Denied	7.60 ↑	Oct 26, 22	7.20	Sep 30, 22	Dec 05, 22

2022 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		12/2021\	3/2022\	6/2022\	9/2022\	12/2021A
Earnings Per Share	3	9.04	10.70	6.82	Reported	2.66	2.57	2.93	3.19	9.95
Filtered/Preliminary Mean**:	1	10.70	10.70	10.70	Surprise Mean	2.61	2.56	2.86	3.06	9.90
30 Day Ago Mean	3	9.27	10.70	7.50	Surprise (%)	1.86	0.53	2.59	4.37	0.50

* 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	Rosa, Ariel L	10.70 ↓	Dec 02, 22	12.31	Oct 20, 22	Dec 02, 22
	Permission Denied 392	Permission Denied	6.82 ↓	Dec 13, 22	7.50	Nov 28, 22	Dec 13, 22
	Permission Denied 398136	Permission Denied	9.60 ↓	Oct 20, 22	10.70	Sep 30, 22	Oct 20, 22

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, 1929-2022		(page 2)	
Long Term Expected Inflation Rate			2.52
Rate for Long-Term U.S. Government Bonds	4.14	(page 5)	
Rate for 20-year U.S. Inflation-Indexed Bonds	1.62	(page 5)	
	2.52		
Stage 3 Growth Rate (real growth + inflation)			**5.68 %**

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	18,076.7	88	3.22%	3.21%
2018	18,609.1	89	3.22%	
2019	19,036.1	90	3.21%	
2020	18,509.1	91	3.14%	
2021	19,609.8	92	3.17%	
2022	20,015.4	**93**	**3.16%**	

(e) Real GDP in 2012 $ downloaded from BEA 3/28/2023.
(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 $

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: Exports	Exports and imports of goods and services: Imports	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: Gross domestic product	Percent change from preceding period: Final sales of domestic product	Percent change from preceding period: Gross domestic purchases	Percent change from preceding period: Final sales to domestic purchasers	Percent change from preceding period: 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	212.6	−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	991.8	767.8	66.8	31.5	37.3	210.3	56.2	1,005.2	1,007.3	1,021.0	997.4	−3.4	−1.4	−4.3	−2.3	−3.4
1939												8.1	7.4	8.1	7.4	8.1

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

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: Total	Personal consumption expenditures: Goods	Personal consumption expenditures: Services	Gross private domestic investment: Total	Gross private domestic investment: Fixed investment: Total	Gross private domestic investment: Fixed investment: Nonresidential: Total	Gross private domestic investment: Fixed investment: Nonresidential: Structures	Gross private domestic investment: Fixed investment: Nonresidential: 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

"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 23-Feb-23

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	19,477.3	18,076.7	1969Q1	993.3	4,923.8
2018	20,533.1	18,609.1	1969Q2	1,009.0	4,938.7
2019	21,381.0	19,036.1	1969Q3	1,030.0	4,971.3
2020	21,060.5	18,509.1	1969Q4	1,038.1	4,947.1
2021	23,315.1	19,609.8	1970Q1	1,051.2	4,939.8
2022	25,464.5	20,015.4	1970Q2	1,067.4	4,946.8

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
2022	n/a	n/a	4.14	n/a	1.62	n/a	2.52

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 2022, 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 2022.

	Long-Term Expected		Stage 3
	Real Growth	Inflation	Growth
Year	in Output	Rate	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
2022	3.16 %	2.52 %	5.68 %

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 2022

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

Follow | Visitors trend 2W ↑ 10W

29.01 -0.05 (-0.17%)
As of 03:39PM EDT. Market open.

Summary | Company Insights | Chart | Conversations | Statistics | **Historical Data**

Currency in USD

Date	Open	High	Low	Close*
Jan 05, 2023	31.11	31.28	30.80	30.91
Jan 04, 2023	31.01	31.49	30.90	31.28
Jan 03, 2023	31.08	31.17	30.55	30.88
Dec 30, 2022	31.02	31.12	30.73	30.98
Dec 29, 2022	31.06	31.36	30.98	31.24
Dec 28, 2022	31.24	31.39	30.84	30.84

*Close price adjusted for splits. **Adjusted close price adjusted for splits and dividend and/or capital gain distributions.

Retrieved March 14, 2023.
Link to web page: http://finance.yahoo.com/quote/CSX/history

Market Value Data for MSDCF
Stock Price for NSC - End of 2022

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

Follow | Visitors trend

206.72 -0.91 (-0.44%)
As of 03:42PM EDT. Market open.

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

Currency in USD

Date	Open	High	Low	Close*
Jan 05, 2023	249.36	250.95	246.79	247.48
Jan 04, 2023	246.52	251.50	246.23	250.90
Jan 03, 2023	247.11	248.30	244.70	247.70
Dec 30, 2022	246.67	247.69	243.94	246.42
Dec 29, 2022	247.24	249.48	246.16	248.21
Dec 28, 2022	249.73	250.41	245.45	245.79

*Close price adjusted for splits. **Adjusted close price adjusted for splits and dividend and/or capital gain distributions.

Retrieved March 14, 2023.
Link to web page: http://finance.yahoo.com/quote/NSC/history

Market Value Data for MSDCF
Stock Price for UNP - End of 2022

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

Follow | Visitors trend 2W ↑ 10W ↑ 9M ↑

194.52 -0.58 (-0.30%)
As of 03:48PM EDT. Market open.

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

Currency in USD

Date	Open	High	Low	Close*
Jan 05, 2023	207.73	208.68	202.76	203.08
Jan 04, 2023	208.09	210.21	207.57	209.24
Jan 03, 2023	207.29	207.87	205.13	207.58
Dec 30, 2022	207.67	208.99	204.68	207.07
Dec 29, 2022	208.04	210.36	207.14	209.22
Dec 28, 2022	210.23	211.23	206.78	206.87

*Close price adjusted for splits. **Adjusted close price adjusted for splits and dividend and/or capital gain distributions.

Retrieved March 14, 2023.
Link to web page: http://finance.yahoo.com/quote/UNP/history

Market Value Data for MSDCF
Shares Outstanding for CSX - End of 2022

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, 2022

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 durin 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 requirement 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 Rul 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 suc 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 a 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 c 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 2,102,408,729 shares of common stock outstanding on September 30, 2022 (the latest practicable date that is closest to the filing date).

Market Value Data for MSDCF
Shares Outstanding for NSC - End of 2022

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, 2022**

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

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

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

(855) 667-3655
(Registrant's 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	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 th 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 p 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 Regulatio 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- 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 revis 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, 2022**
Common Stock ($1.00 par value per share)	231,514,213 (excluding 20,320,777 shares held by the registrant's consolidated subsidiaries)

Market Value Data for MSDCF
Shares Outstanding for UNP - End of 2022

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, 2022

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	**68179**
(Address of principal executive offices)	(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 regis
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 Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file and (2) has been subject to such filing requirements for the past 90 days.

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a sn company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "sm 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 transi complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Ac

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

As of October 14, 2022, there were 614,800,800 shares of the Registrant's Common Stock outstanding.

2022 Cost of Equity Using STB's MSDCF

Company	CSX		NSC		UNP	
Year	2022		2022		2022	
Inputs						
Initial Cash Flow	$3,919.45		$2,598.46		$6,089.60	
Input for Terminal C.F.	$4,147.22		$3,088.79		$6,907.60	
Stage One Growth	11.840%		9.400%		9.600%	
Stage Two Growth	10.280%		10.280%		10.280%	
Stage Three Growth*	5.680%		5.680%		5.680%	
Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
1	$4,384	$3,807	$2,843	$2,519	$6,674	$5,905
2	4,903	3,698	3,110	2,442	7,315	5,726
3	5,483	3,591	3,402	2,368	8,017	5,552
4	6,132	3,488	3,722	2,296	8,787	5,383
5	6,858	3,388	4,072	2,226	9,630	5,220
6	7,563	3,245	4,491	2,175	10,620	5,093
7	8,341	3,108	4,952	2,126	11,712	4,969
8	9,198	2,976	5,461	2,077	12,916	4,848
9	10,144	2,851	6,023	2,030	14,244	4,730
10	11,187	2,730	6,642	1,984	15,708	4,615
Terminal	132,141	32,250	116,505	34,806	256,182	75,266
Sum of Pres. Values		$65,132.62		$57,049.73		$127,306.80
Market Value (input)		$65,132.62		$57,049.73		$127,306.80
Cost of Equity	**15.15%**		**12.84%**		**13.03%**	
Prev. Yr. Cost of Equity	14.69%		13.88%		13.87%	

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			0.00%

Market Value of Preferred Equity

Outstanding Shares	Average Price	Market Value
	$0.000	**$0**