

BEFORE THE
SURFACE TRANSPORTATION BOARD

Finance Docket No. 36873

UNION PACIFIC CORPORATION AND UNION PACIFIC RAILROAD COMPANY
—CONTROL—
NORFOLK SOUTHERN CORPORATION AND NORFOLK SOUTHERN
RAILWAY COMPANY

VERIFIED STATEMENT

OF

MICHAEL BOYLES AND DR. DIVYA MATHUR

April 29, 2026

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I. INTRODUCTION

A. Qualifications

1. We are Michael Boyles and Dr. Divya Mathur.¹

2. Michael Boyles is a transportation industry expert with more than 35 years of experience conducting economic, financial, cost, and operational analyses in both regulatory and consulting settings. Until his recent retirement, he served as a Supervisory Transportation Industry Analyst and Chief of the Section of Regulatory Economics in the Office of Economics at the Surface Transportation Board (“STB” or “Board”). In that role, he managed major initiatives to modernize and improve the STB’s Uniform Rail Costing System, oversaw and modernized the costing of the STB’s Confidential Carload Waybill Sample (“CCWS”), oversaw analyses supporting rate reasonableness cases, and contributed to key rulemakings involving railroad costing, rate regulation, and policy development. His work also included the development and defense of cost-of-capital models and the evaluation of environmental impacts for new railroad construction projects. Prior to joining the STB in 2004, he was a consultant at FTI Consulting, where he provided analytical support and expert testimony in transportation and telecommunications matters before the STB, the Federal Communications Commission, and state Public Utility Commissions. He began his career at ALK Associates, where he developed quantitative models to support railroad mergers and designed operational systems to improve asset management and logistics for transportation clients. He holds a Bachelor of Science in

¹ We previously submitted a joint verified statement dated December 16, 2025, as part of the Application submitted to the Board on December 19, 2025. At the request of Applicants in this proceeding, we have prepared this updated joint statement for inclusion in the Amended Application to reflect updates to the Operating Plan and the diversion study.

Engineering from Princeton University, with a concentration in Engineering and Management Systems. His qualifications and work experience are summarized in his curriculum vitae, attached hereto as **Appendix A**.

3. Dr. Divya Mathur is an economist and a Managing Principal at Analysis Group, Inc., an economic, financial, and strategy consulting firm. She specializes in the application of microeconomics, statistics, and econometrics to complex litigation matters, government and regulatory investigations, and consulting engagements in the areas of antitrust and competition and complex commercial disputes. She has provided expert economic testimony on antitrust, class certification, and damages issues at numerous depositions and trials in federal court and has been qualified by courts as an expert economist. Her economic and financial expertise includes the analysis of market structure and competitive dynamics; economic and financial modeling in merger review and regulatory proceedings; assessment of competitive effects pertaining to mergers and antitrust conduct such as price-fixing, information sharing monopolization, and alleged exclusionary practices; modeling of damages and lost profits; valuation of businesses and assets; and evaluation of financial performance and pricing strategies in regulated industries such as transportation, telecommunications, pharmaceuticals, and financial services. Her engagements have included work on behalf of the United States Department of Justice and the Federal Trade Commission, as well as companies in numerous industries including transportation, technology, telecommunications, manufacturing, and financial services. Dr. Mathur has also submitted expert statements before the STB in connection with compensation for trackage rights and has conducted economic analysis in other regulatory contexts involving the Federal Communications Commission and the International Trade Commission. Dr. Mathur has published and presented extensively on topics including merger analysis, antitrust issues, and the intersection of

economics and financial analysis in regulatory enforcement. She holds an M.A. and Ph.D. in economics from The University of Chicago and an A.B. in economics and mathematics from Mount Holyoke College. She has lectured on competitive strategy and microeconomics at The University of Chicago and has served as a guest lecturer on topics in competitive strategy and industrial structure at the Kellogg School of Management at Northwestern University. Her qualifications, experience, and the matters in which she has provided expert testimony are summarized in her curriculum vitae, attached hereto as **Appendix B**.

B. Assignment

4. We have been asked by Applicants in this proceeding to provide two analyses related to the proposed merger of Union Pacific Railroad Company (“UP”) and Norfolk Southern Railway Company (“NS”) for the purposes of calculating certain economic and financial impacts of the transaction for use in the Amended Application, including for incorporation into the *pro forma* financial statements. First, we were asked to develop the total dollar value of certain operating savings expected from optimizing the two railroads’ operations, as described in the Operating Plan (Exhibit 13 to the Amended Application) without accounting for any additional traffic the combined network would attract. Second, we were asked to estimate the additional operating costs associated with the additional traffic the combined network is projected to attract through extended hauls, rail-to-rail diversions, and truck-to-rail diversions.

C. Materials considered

5. Our opinions, and the bases for these opinions, are set forth in this statement and the attached exhibits and appendices. In reaching these opinions, we have considered various data, documents, and other information, including:

- a. The Operating Plan for the combined UP/NS network, described in the Joint Verified Statement of Eric Gehringer and John F. Orr, including the Base Plan, which represents the combined railroads' existing traffic prior to any merger-related efficiencies, the Optimized Plan, which represents the projected operational efficiencies from serving the two railroads' existing traffic as part of an integrated system, and the Growth Plan, which includes the incremental traffic the merged railroads anticipate serving;
- b. Data on traffic expected to be diverted to the combined network through extended hauls, rail-to-rail diversions, and truck-to-rail diversions, as described in the Verified Statement of David T. Hunt;
- c. Data, information, and Excel programs provided by the Board related to its Uniform Rail Costing System ("URCS"); and
- d. R-1 annual reports of UP and NS.

6. In addition, we have relied on our skills, knowledge, training, education, and experience. We reserve the right to update our opinions, should additional relevant documents or information be made available to us.

II. SUMMARY OF OPINIONS

7. Based on our review and analysis of the data and information identified herein, and our skills, knowledge, experience, expertise, and training, we have reached the opinions summarized below.

8. URCS is a three-phase model developed and maintained by the Board that converts railroads' accounting and operating data into railroad-specific unit costs and shipment-

specific variable cost estimates. Our analyses use the Board's 2023 Phase II and Phase III URCS models to estimate: (i) certain cost savings associated with the operating efficiencies that are expected to be realized as a result of the integration of the UP and NS networks and operations; and (2) the costs associated with extended hauls, rail-to-rail diversions, and truck-to-rail diversions the combined network is expected to attract. *See Section III.*

9. Based on our calculations, the operating cost savings resulting from system-wide operating efficiencies that are expected to be achieved from the integration of UP and NS's network and operations in the Optimized Plan (which does not account for any additional traffic the combined network would attract) are approximately \$77.52 million (in 2023 USD). These savings are calculated by applying 2023 URCS Phase II unit costs to changes in each operating metric between the Base Plan and the Optimized Plan, using pre-merger UP and NS unit costs—applied respectively to savings on the legacy UP and legacy NS networks—to represent the costs the combined network would avoid as a result of the merger. To avoid potential double counting of operating savings calculated by other witnesses and only retain relevant cost categories, we exclude certain URCS cost components from our calculation. **Figure 1** below shows how each operating metric is reduced between the Base Plan and the Optimized Plan for the combined network, and the corresponding cost savings associated with those reductions. *See Section IV.*

Figure 1. Summary of Merger-Related Reductions in Operating Expenses²

Operating Metric	Reduction	Savings (in 2023 USD)
Train Miles	1,716,759	\$22,470,385
Locomotive Unit Miles	4,735,836	\$28,109,062
Gross Ton Miles	2,321,693,067	\$5,848,514
Car Miles	4,973,813	\$204,386
Car Days	8,651	\$43,221
Industry Switches	55,367	\$1,028,216
Interchange Switches	346,985	\$7,088,232
Intratrain and Intertrain Switches	132,643	\$668,663
Intermodal Lifts	258,768	\$12,057,816
Total	-	\$77,518,496

10. We calculate approximately \$2,270 million (in 2023 USD) of net increases in operating costs from the additional traffic the combined UP/NS network is expected to attract in the Growth Plan from extended hauls, rail-to-rail diversions, and truck-to-rail diversions. The diverted traffic includes shipments previously handled entirely by other railroads or trucks as well as “extended haul” diversions previously handled by UP and/or NS, for which we also received data on the corresponding “offsetting” traffic reflecting the original pre-merger UP or NS routings. The operating costs were calculated using a post-merger combined UP/NS URCS model. Specifically, we develop a post-merger URCS Phase II model by combining 2023 UP and NS inputs to reflect the integrated cost structure of the merged entity and apply the resulting system-average unit costs in URCS Phase III to the diverted traffic data. To avoid potential double counting and only retain relevant cost categories, we adjust the model to exclude certain URCS cost categories such as depreciation and ROI. **Figure 2** below summarizes our results. *See Section V.*

² See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

Figure 2. Incremental Costs of Diverted Traffic³

	Costs (2023 USD)
Incremental Costs Including Full Extended Haul Shipments	\$2,646,296,943
Incremental Costs for Offsetting Traffic	-\$376,134,513
Incremental Costs of Diverted Traffic	\$2,270,162,430

III. OVERVIEW OF URCS

11. We have been asked to estimate: (1) certain cost savings associated with the operating efficiencies that are expected to be realized as a result of the integration of the UP and NS networks and operations in the Optimized Plan (which does not account for additional traffic the combined network is expected to attract); and (2) the costs associated with extended hauls, rail-to-rail diversions, and truck-to-rail diversions the combined network is expected to attract in the Growth Plan. For both components of our analysis, we rely on URCS to estimate the relevant costs (or cost savings).⁴

12. URCS is a model developed by the Board that is commonly used in matters governed by the Board to estimate the variable costs associated with railroad shipments.⁵ URCS has three phases.⁶

- a. **Phase I**, which was only run during the initial development of URCS by the Board's predecessor (the Interstate Commerce Commission) in the 1980s,

³ See **Figure 12**.

⁴ See "Uniform Rail Costing System (URCS)," *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/uniform-rail-costing-system/>, accessed November 9, 2025.

⁵ See Major Issues in Rail Rate Cases, Ex Parte No. 657 (Sub-No. 1), October 30, 2006, p. 47 ("The Board uses the Uniform Rail Costing System (URCS) to determine a carrier's variable costs. URCS is a 'general purpose costing system for all regulatory costing purposes,' designed to measure system-wide average variable costs.").

⁶ See "Uniform Rail Costing System (URCS)," *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/uniform-rail-costing-system/>, accessed November 9, 2025 ("URCS is divided into three phases, or steps.").

used regression analysis to determine the extent to which various railroad expenses vary with respect to various operating metrics (e.g., gross ton miles, train miles, etc.).⁷

- b. **Phase II**, which is run annually by the Board for each Class I railroad, uses annual data reported by the railroads in their respective R-1 annual reports and other railroad-specific and industry-wide inputs to calculate system-average variable “unit costs.”⁸ A variable unit cost represents the cost, in dollars, per unit of an operating metric, such as cost per gross ton mile or cost per train mile. Specifically, the Board annually produces Phase II worktables for each Class I railroad.⁹ In these worktables, the Board determines the portion of each expense item reported in the R-1 annual reports that is variable (based in part on the regression analysis developed in Phase I) and allocates those variable expenses across a set of system-wide operating metrics. The system-

⁷ See “Uniform Rail Costing System (URCS),” *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/uniform-rail-costing-system/>, accessed November 9, 2025 (“**Phase I**: During this phase, the Board’s predecessor, the Interstate Commerce Commission, developed regression coefficients needed to calculate cost variabilities. This phase was only run during URCS’s original development in the 1980s.”).

⁸ See “Uniform Rail Costing System (URCS),” *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/uniform-rail-costing-system/>, accessed November 9, 2025 (“**Phase II**: During this phase, the Board calculates system average variable unit costs from R-1 and other data filed by the railroads. It is run annually using railroad information specific to that year.”). The Board also creates regional system-average variable unit costs.

⁹ See, e.g., “UP2023.xlsx,” downloaded from: “Uniform Rail Costing System (URCS),” *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/uniform-rail-costing-system/> (at link “URCS 2023 Worktables”), accessed November 20, 2025 (“UP 2023 URCS Phase II Worktable”); “NS2023.xlsx,” downloaded from: “Uniform Rail Costing System (URCS),” *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/uniform-rail-costing-system/> (at link “URCS 2023 Worktables”), accessed November 20, 2025 (“NS 2023 URCS Phase II Worktable”). Throughout this report, we refer to the Board’s annually published URCS Phase II worktables more generally as the “URCS Phase II Worktables.” To refer to specific cells within the URCS Phase II Worktables, we use the URCS Phase II named cell references. For example, Cell E8 of the “A1P1” tab of the URCS Phase II Worktables corresponds to Line 101 and Column “C1” of Tab “A1P1,” which has an URCS named cell reference of A1L101C1.

average variable unit cost for each operating metric equals the sum of all variable expenses allocated to that operating metric, divided by the total system-wide amount of the operating metric.¹⁰ In developing these unit costs, the Phase II model analyzes one to five years of historical data, depending on the expense item.¹¹ The final Phase II unit costs are grouped into three broad cost categories for each operating metric: (1) operating expenses (“OPR”); (2) depreciation, rents, and leases expenses (“DRL”); and (3) return on investment expenses (“ROI”).¹²

- c. **Phase III**, which is also updated annually by the Board, is used to calculate the variable costs associated with specific railroad shipments.¹³ Specifically, the Phase III model applies the system-average variable unit costs developed in Phase II to the specific properties of an individual shipment—such as the distance of the haul, the net weight of the shipment, and whether the shipment originated and terminated on the railroad or interchanged to or from another railroad—to estimate the variable costs attributable to the shipment.¹⁴

¹⁰ See, e.g., URCS Phase II Worktables, Tab “D1P1,” Columns “C10,” “C15,” and “C20.”

¹¹ See, e.g., URCS Phase II Worktables, Tab “A1P1,” and Tab “D3P1,” Column “C8.”

¹² See, e.g., URCS Phase II Worktables, Tab “E1P1”; “The Railroad Cost Program (Microsoft Excel Version),” *Surface Transportation Board*, 2021, available at https://www.stb.gov/wp-content/uploads/STBRailroadCostProgram_ManualForExcel.pdf, accessed November 23, 2025 (“URCS User Manual”), Appendix 2, pp. 36–37.

¹³ See “Uniform Rail Costing System (URCS),” *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/uniform-rail-costing-system/>, accessed November 9, 2025 (“Phase III: During this phase, the Board applies unit costs from Phase II to calculate the total variable costs of railroad shipments. It is run annually to cost the STB’s Waybill Sample. URCS is also used by parties to submit cost evidence before the Board.”).

¹⁴ See “STBRailroadCostProgram_2006-2023.xlsm,” downloaded from: “Uniform Rail Costing System (URCS),” *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/uniform-rail-costing-system/> (at link “URCS Phase III Railroad Cost Program”), accessed November 20, 2025 (“URCS Phase III Model”), Tabs “RailroadCostProgram” and “RailroadUnitCostXML.”

13. In our analyses, we have relied on both Phase II and Phase III of URCS to develop our cost estimates.

IV. OPERATING COST SAVINGS FROM SYSTEM-WIDE OPERATING EFFICIENCIES

14. In this section, we calculate the operating cost savings resulting from system-wide operating efficiencies that are expected to be achieved from the integration of UP and NS's network and operations, before accounting for any additional traffic the combined network would attract. Specifically, we estimate the cost savings associated with system-wide reductions in train miles ("TMs"), locomotive unit miles ("LUMs"), gross ton miles ("GTMs"), car miles ("CMs"), car days ("CDs"), and switches. The savings are calculated by applying 2023 URCS unit costs to changes in each operating metric between the Base Plan and the Optimized Plan. We estimate operating cost savings using pre-merger 2023 unit costs for UP and NS, as these savings represent the costs the combined network would avoid due to the merger.^{15,16} Specifically, we use UP unit costs to calculate savings in operating metrics that occur on the UP portion of the combined network ("legacy UP"), which best reflect the costs of western operations, and NS unit costs to calculate savings in operating metrics that occur on the NS portion ("legacy NS"), which best reflect the costs of eastern operations. Our estimate of operating cost savings are included among other cost savings resulting from merger synergies in the Verified Statement of Grant Janke.¹⁷

¹⁵ We hold unit costs fixed at pre-merger levels. Therefore, any reduction in unit costs the combined network achieves is not accounted for in our estimate.

¹⁶ Because we rely on 2023 URCS unit costs, all cost estimates in our verified statement are in 2023 dollars.

¹⁷ Verified Statement of Grant Janke, ¶ 29.

A. Inputs

15. The Operating Plan uses MultiRail to model the combined UP and NS rail operations under various scenarios.¹⁸ The Base Plan scenario follows UP's and NS's 2023 pre-merger blocking and train service plans, while the Optimized Plan scenario represents the integrated operating plan for the combined network, holding total traffic constant at pre-merger levels (*i.e.*, excluding any incremental traffic the combined network would attract). For each scenario, MultiRail generates system-wide operating metrics—including train miles, GTMs, car miles, and switches—for the combined network, as well as the allocation of those metrics across the legacy UP and legacy NS portions of the combined network. Differences in these operating metrics between the Base Plan and the Optimized Plan represent efficiency-driven reductions in operating activity. We estimate the cost savings from these reductions in operating activity below.

B. System-wide operating metrics and associated URCS costs

16. To estimate savings from system-wide operating efficiencies, we map each operating metric to its relevant URCS Phase II unit costs. MultiRail directly outputs train miles, GTMs, car miles, and switches. For these metrics, we calculate the change between the Base Plan and the Optimized Plan and apply the relevant URCS unit costs to estimate cost savings. Because MultiRail does not directly output LUMs or car days, we first estimate these metrics under the Base Plan and the Optimized Plan using system-average factors from URCS, and then apply the relevant URCS unit costs to estimate cost savings.

¹⁸ Joint Verified Statement of Eric Gehringer and John F. Orr ("Operating Plan" or "Op. Plan"), ¶¶ 19–21.

17. As detailed below, we apply all OPR unit costs that URCS associates with each operating metric, except for road switching costs and “below-the-wheel” switching costs, which consist of “SEM Road Operations” costs and “Switching Track Ownership and Maintenance” costs in URCS. We exclude road switching costs, which are costs that URCS allocates to switching that occurs outside of yards, because we understand that MultiRail’s Yard Output—our source for switch reduction estimates—reports only switches occurring in yards, and does not capture road switching. We exclude below-the-wheel switching costs to avoid potential double counting, as Grant Janke separately quantifies savings associated with yard rationalization synergies in his verified statement.¹⁹

18. Across all operating metrics in our assessment of the cost savings from the Optimized Plan, we also exclude URCS unit costs associated with DRL, General Overhead Expenses (“GOH”), and ROI. We exclude DRL and GOH costs from our calculation to avoid double counting, as depreciation is separately accounted for by Carrie Powers, and GOH and other administrative cost savings in the Optimized Plan, as compared to the Base Plan, are separately accounted for by Grant Janke.²⁰ ROI is an URCS-imputed cost-of-capital charge that

¹⁹ Verified Statement of Grant Janke, ¶ 55.

²⁰ App. Vol 1, App’x F; Notes to Pro Forma Income Statement, Base Year, Note 3 (“Depreciation & amortization – Represents increased depreciation expense due to the estimated fair value increase to properties, net.”); Verified Statement of Grant Janke, ¶¶ 22–26. We exclude all portions of DRL costs in our operating cost savings estimates, *i.e.*, we exclude both depreciation costs and rents and lease costs. Excluding rents and leases in our estimates of operating costs savings avoids potential double counting rents and lease savings quantified by other witness statements and/or is conservative. Grant Janke states that “[m]echanical non-labor savings” may for example include “consolidat[ing] freight car fleets to enable the utilization of otherwise underutilized assets[.]” Verified Statement of Grant Janke, ¶ 33. However, rents and lease expenses are included in our calculations of estimated operating costs from diverted traffic in **Section V**. We include rents and leases in our estimated operating costs from diverted traffic because, insofar such costs are incurred to accommodate the diverted traffic, they are not separately accounted for by other witnesses.

represents a reasonable return on capital investments—not an operating expense reported in railroad financial statements.²¹

1. Train miles

19. A train mile is the movement of a train over a distance of one mile.²² On the combined network, improved operating efficiency—as reflected in the Optimized Plan relative to the Base Plan—would enable UP and NS to move the same total traffic volume with fewer total train miles. **Figure 3** (Panel I) shows that the Operating Plan (and the associated workpapers) projects reductions of 675,264 train miles for legacy UP and 1,041,496 train miles for legacy NS, resulting in a combined reduction of 1,716,759 train miles.²³

20. Our calculation of operating cost savings from reduced train miles includes all variable OPR costs that URCS associates with train miles, classified as “Train Mile – Crew” and “Train Mile – Other Than Crew” (see **Figure 3**, Panel II). The “Train Mile – Crew” category primarily reflects costs for “Engine Crews” and “Train Crews.”²⁴ The “Train Mile – Other Than

²¹ “Economic Data,” *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/economic-data/>, accessed November 20, 2025 (“Within the R-1 reports is a section titled Schedule 250. This schedule is used to develop rate of return on net investment (ROI) for use in revenue adequacy determinations.”).

²² R-1 Annual Report, *Surface Transportation Board*, available at <https://www.stb.gov/wp-content/uploads/R1-7-31-2026.pdf>, accessed November 23, 2025 (“R-1 Annual Report”), Schedule 755 and p. 75.

²³ We were provided train miles under the Base Plan and Optimized Plan by subregion (UP, NS, Detroit CSAO, N Jersey CSAO, and S Jersey CSAO). Our calculation of the UP/NS split assigns the Detroit CSAO, N Jersey CSAO, and S Jersey CSAO subregions to NS. We understand that the estimate of total daily train miles for the Optimized Plan in the Op. Plan Workpaper, “C-Train Type Statistics vFinal.xlsx,” Tab “Output_T2,” differs by one train mile from the estimate in Tables 2 and 3 of the Operating Plan because of rounding.

²⁴ See URCS Phase II Worktables, Tab “D3P1,” Column “C30,” Cells D3L191C30 and D8L711C1; Tab “E1P1,” Line 104.

Crew” category primarily reflects costs associated with “Train Inspection” and “Clearing Wrecks.”²⁵

21. Based on these URCS unit costs, **Figure 3** (Panel III) reports total train mile cost savings of \$8,897,151 for legacy UP and \$13,573,235 for legacy NS, for a combined savings of \$22,470,385.

Figure 3. Train Mile Operating Reductions, URCS Unit Costs, and Estimated Cost Savings²⁶

		UP	NS
<u>Panel I: TM Operating Reductions</u>			
[A]	Train Miles in the Base Plan	110,846,981	60,431,504
[B]	Train Miles in the Optimized Plan	110,171,717	59,390,008
[C] = [A] - [B]	Train Miles Saved	675,264	1,041,496
<u>Panel II: URCS Unit Costs</u>			
[D]	Train Mile - Crew	\$12.34	\$12.31
[E]	Train Mile - Other Than Crew	\$0.84	\$0.72
<u>Panel III: Estimated Cost Savings</u>			
[F] = [C] * [D]	Train Mile - Crew	\$8,331,211	\$12,823,663
[G] = [C] * [E]	Train Mile - Other Than Crew	\$565,940	\$749,572
[H] = [F] + [G]	Total Train Mile Cost Savings	\$8,897,151	\$13,573,235
[I] = Sum of [H] Combined Train Mile Cost Savings		\$22,470,385	

2. *Locomotive unit miles*

22. A LUM is the movement of a locomotive unit under its own power over a distance of one mile.²⁷ On the combined network, improved operating efficiency—as reflected in

²⁵ See URCS Phase II Worktables, Tab “D3P1,” Column “C25,” Cells D3L191C25 and D8L709C1; Tab “E1P1,” Line 103.

²⁶ See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

²⁷ R-1 Annual Report, Schedule 755 and p. 75.

the Optimized Plan relative to the Base Plan—would enable UP and NS to move the same total traffic volume with fewer LUMs.

23. Because MultiRail does not directly output LUMs, we use information from URCS to calculate LUMs from train miles. Specifically, we calculate LUMs from train miles reported in MultiRail for each train type—bulk, local, auto, intermodal, and manifest—by applying the corresponding average number of locomotive units per train from URCS.²⁸ Accordingly, total LUMs are calculated as the sum of: (i) total unit train miles multiplied by the average number of locomotives per unit train; (ii) total way train miles multiplied by the average number of locomotives per way train; and (iii) total through train miles multiplied by the average number of locomotives per through train.²⁹ **Figure 4** (Panel I) shows reductions of 2,371,070 LUMs for legacy UP and 2,364,766 LUMs for legacy NS, resulting in a combined reduction of 4,735,836 LUMs.³⁰

24. We note that **Figure 4** shows no reduction in unit train miles on the combined network, and therefore we do not quantify any associated LUM cost savings. We also note that **Figure 4** shows a negative reduction (*i.e.*, an increase) in way train miles on legacy UP, which we understand reflects a shift in way train miles from the legacy NS network to the legacy UP network under the Optimized Plan. Our cost savings estimates account for this shift by reducing the LUM cost associated with way trains that are costed using the legacy NS cost structure, and

²⁸ URCS User Manual, p. 4.

²⁹ The URCS Phase II Worktables report the average locomotives per train in Cells E2L208C1 (unit train), E2L209C1 (way train), and E2L210C1 (through train). For our LUM calculations, we treat both bulk and auto trains as unit trains, local trains as way trains, and we treat both intermodal and manifest trains as through trains.

³⁰ For each train type, we were provided train miles under the Base Plan and Optimized Plan by subregion (UP, NS, Detroit CSAO, N Jersey CSAO, and S Jersey CSAO). Our calculation of the UP/NS split for LUMs, which is based on train miles by train type, assigns the Detroit CSAO, N Jersey CSAO, and S Jersey CSAO subregions to NS.

instead applying the legacy UP unit costs to the corresponding increase in way train miles on legacy UP.

25. Our calculation of operating cost savings from reduced LUMs includes all variable OPR unit costs that URCS associates with LUMs (*see* **Figure 4**, Panel II). These unit costs primarily reflect “Locomotive Fuel” used in train operations and “Diesel Road Locomotive Repairs.”³¹

26. Based on these URCS unit costs, **Figure 4** (Panel III) reports total LUM cost savings of \$13,573,889 for legacy UP and \$14,535,173 for legacy NS, for a combined savings of \$28,109,062.

³¹ See URCS Phase II Worktables, Tab “D3P1,” Column “C20,” Cells D3L191C20 and D8L712C1.

Figure 4. LUM Operating Reductions, URCS Unit Costs, and Estimated Cost Savings³²

		UP	NS
<u>Panel I: LUM Operating Reductions</u>			
[A]	Unit Train Miles Saved	0	0
[B]	Unit Train Average Locomotive Units	3.43	2.36
[C] = [A] * [B]	Unit Train LUMs Saved	0	0
[D]	Way Train Miles Saved	-11,815	19,371
[E]	Way Train Average Locomotive Units	2.05	1.51
[F] = [D] * [E]	Way Train LUMs Saved	-24,175	29,301
[G]	Through Train Miles Saved	687,078	1,022,125
[H]	Through Train Average Locomotive Units	3.49	2.28
[I] = [G] * [H]	Through Train LUMs Saved	2,395,245	2,335,465
[J] = [C] + [F] + [I]	Total LUMs Saved	2,371,070	2,364,766
<u>Panel II: URCS Unit Costs</u>			
[K]	LUM - Total OPR	\$5.72	\$6.15
<u>Panel III: Estimated Cost Savings</u>			
[L] = [J] * [K]	LUM - Total OPR	\$13,573,889	\$14,535,173
[M] = Sum of [L] Combined LUM Cost Savings		\$28,109,062	

3. Gross ton miles

27. A GTM is the movement of one ton (2,000 lb) over one mile, inclusive of tons associated with cars and their contents.³³ On the combined network, improved operating efficiency—as reflected in the Optimized Plan relative to the Base Plan—would enable UP and NS to move the same total traffic volume with fewer total GTMs. **Figure 5** (Panel I) shows that the Operating Plan projects a reduction of 4,173,064,084 GTMs for legacy UP and an increase of

³² See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

³³ R-1 Annual Report, Schedule 755 and p. 75. While R-1 annual report includes locomotive weight in total GTMs, URCS excludes it from its GTM calculations, and we understand that MultiRail does as well. See URCS User Manual, p. 4.

1,851,371,017 GTMs for legacy NS, resulting in a combined net reduction of 2,321,693,067 GTMs.³⁴

28. Our calculation of operating cost savings from reduced GTMs includes all variable OPR unit costs that URCS associates with GTMs, classified as “Road Operations” and “Running Track Ownership and Maintenance” (*see* **Figure 5**, Panel II). “Road Operations” primarily reflect costs associated with “Locomotive Fuel” used in train operations and “Diesel Road Locomotive Repairs.”³⁵ “Running Track Ownership and Maintenance” primarily reflects costs associated with “Rail and Other Track Material,” as well as “Signals and Interlockers.”^{36,37}

29. Based on these URCS unit costs, **Figure 5** (Panel III) reports total GTM cost savings of \$11,242,805 for legacy UP and *negative* \$5,394,291 for legacy NS, for a combined net savings of \$5,848,514, which we understand reflects a shift in GTMs from the legacy UP network to the legacy NS network under the Optimized Plan. Our cost savings estimates appropriately account for this shift by reducing the cost associated with GTMs using the legacy UP cost structure, and instead applying the legacy NS unit costs to the corresponding increase in GTMs on legacy NS. On net, this reduces our cost savings estimates, because legacy NS has higher GTM unit costs than legacy UP.

³⁴ We were provided the GTM split between legacy UP and legacy NS in the “Subregion” tabs of the Op. Plan Workpaper, “C-Traffic Category Splits vFinal.xlsx.” We understand that the estimates in those tabs contain a small discrepancy relative to the Operating Plan totals for the Base Plan and the Optimized Plan, due to accumulated rounding errors. To be consistent with the Operating Plan, we apply the UP/NS split from the “Subregion” tabs (excluding stranded and unmoved blocks) to the Operating Plan’s total GTMs. Our calculation of the UP/NS split assigns the Detroit CSAO, N Jersey CSAO, and S Jersey CSAO subregions to NS.

³⁵ *See* URCS Phase II Worktables, Tab “D3P1,” Column “C10,” Cells D3L191C10 and D8L702C1.

³⁶ *See* URCS Phase II Worktables, Tab “D1P1,” Column “C10,” Cells D1L157C10 and D8L701C1.

³⁷ URCS derives OPR unit costs for both “Road Operations” and “Running Track Ownership and Maintenance” from R-1 Annual Report, Schedule 410 - Railway Operating Expenses. Accordingly, it is appropriate to include both categories in our cost savings calculation.

Figure 5. GTM Reductions, URCS Unit Costs, and Estimated Cost Savings³⁸

		UP	NS
<u>Panel I: GTM Operating Reductions</u>			
[A]	GTM in the Base Plan	831,613,386,432	346,243,923,252
[B]	GTM in the Optimized Plan	827,440,322,347	348,095,294,269
[C] = [A] - [B]	GTM Saved	4,173,064,084	-1,851,371,017
<u>Panel II: URCS Unit Costs</u>			
[D]	GTM - Road Operations	\$0.0018	\$0.0019
[E]	GTM - Running Track Ownership and Maintenance	\$0.0009	\$0.0010
<u>Panel III: Estimated Cost Savings</u>			
[F] = [C] * [D]	GTM - Road Operations	\$7,684,954	-\$3,492,547
[G] = [C] * [E]	GTM - Running Track Ownership and Maintenance	\$3,557,851	-\$1,901,744
[H] = [F] + [G]	Total GTM Cost Savings	\$11,242,805	-\$5,394,291
[I] = Sum of [H] Combined GTM Cost Savings		\$5,848,514	

4. *Car miles and car days*

30. URCS calculates freight car costs for cars using costs associated with two metrics: car miles and car days.³⁹ A car mile is the movement of one freight car over a distance of one mile.⁴⁰ A car day is the use of one freight car for one day. Car days are computed as total car miles divided by the average miles a car travels per day.^{41,42} On the combined network, improved

³⁸ See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

³⁹ URCS User Manual, p. 6.

⁴⁰ R-1 Annual Report, Schedule 755 and p. 75.

⁴¹ URCS applies car-miles-per-car-day averages of 585.32 (UP) and 512.37 (NS). See URCS Phase II Worktables, Tab “E2P1,” Column “C22.” See also URCS Phase III Model, Tab “RailroadCostProgram,” Rows 173 and 203:204.

⁴² URCS distinguishes between car miles running and car miles in the yard (*i.e.*, in switching services), and between car days running and car days in the yard. Our cost savings estimates conservatively only include car miles running and car days running, because we understand that the car mile reductions calculated by MultiRail correspond to reductions in car miles running. For simplicity, we refer to these as “car miles” and “car days.” See URCS Phase II Worktables, Tabs “D6P1A” to “D6P15,” Columns “C13” and “C21” (which are the included car mile/car day “running” unit costs), and Columns “C16” and “C24” (which are the excluded car mile/car day “yard” unit costs).

operating efficiency—as reflected in the Optimized Plan relative to the Base Plan—would enable UP and NS to move the same total traffic volume with lower freight car costs.

31. Because URCS applies different unit costs by car type (*e.g.*, covered hopper, intermodal flatcar, tank, plain gondola, etc.), the magnitude of savings depends on the specific car type in which car mile reductions are achieved. In addition, URCS calculates car mile and car day costs differently for railroad-owned and private-line cars. Specifically, because URCS assigns no OPR costs to private-line cars,⁴³ we quantify savings only for railroad-owned cars.

32. MultiRail reports car miles by car type but does not distinguish whether those miles are attributable to railroad-owned or private-line cars. Accordingly, for each car type and railroad, we apportion car miles between these two categories based on the shares of railroad-owned car miles reported in the 2023 R-1 annual reports.⁴⁴ **Figure 6** (Panel I) shows reductions of 4,344,423 railroad-owned car miles for legacy UP and 629,390 railroad-owned car miles for legacy NS, resulting in a combined reduction of 4,973,813 railroad-owned car miles.⁴⁵ Similarly, **Figure 6** shows reductions of 7,422 railroad-owned car days for legacy UP and 1,228 railroad-owned car days for legacy NS, resulting in a combined reduction of 8,651 railroad-owned car

⁴³ See URCS Phase II Worktables, Tab “E1P2,” where only DRL expenses are quantified for private line cars.

⁴⁴ R-1 Annual Report, Union Pacific, 2023, available at https://www.up.com/cs/groups/public/@uprr/@investor/documents/investordocuments/pdf_up_r1_2023.pdf, accessed November 23, 2025 (“UP 2023 R-1 Annual Report”), Schedule 755; R-1 Annual Report, Norfolk Southern, 2023, available at https://filecache.investorroom.com/mr5ir_nscorp/948/2023%20NS%20Consolidated%20R1%20Schedules%20and%20Footnotes.pdf, accessed November 23, 2025 (“NS 2023 R-1 Annual Report”), Schedule 755.

⁴⁵ We were provided the car miles split between legacy UP and legacy NS for each car type in the “Subregion” tabs of the Op. Plan Workpaper, “C-Car Type Splits vFinal.xlsx.” We understand that the estimates in those tabs contain a small discrepancy relative to the Operating Plan totals for the Base Plan and the Optimized Plan, due to accumulated rounding errors. To be consistent with the Operating Plan, we apply the UP/NS split from the “Subregion” tabs (excluding stranded and unmoved blocks) to the Operating Plan’s total car miles. Our calculation of the UP/NS split assigns the Detroit CSAO, N Jersey CSAO, and S Jersey CSAO subregions to NS.

days. **Exhibit 1** reports reductions in car miles by car type, and **Exhibit 2** reports reductions in car days by car type.

33. Our calculation of operating cost savings from reduced railroad-owned car miles and car days each includes all variable OPR unit costs that URCS associates with car miles running and car days running, respectively. These unit costs primarily reflect freight car repairs.⁴⁶ **Exhibits 1** and **2** list these unit costs by car type.

34. Based on these URCS unit costs, **Figure 6** (Panel II) reports total car miles and car days cost savings of *negative* \$115,496 for legacy UP and \$363,103 for legacy NS, for a combined net savings of \$247,607. Under the Optimized Plan, UP's car mile and car day costs rise even as total car miles and car days fall, reflecting a compositional shift toward car types with higher unit costs (*see Exhibits 1 and 2*).

⁴⁶ See URCS Phase II Worktables, Tabs "D6P1A" to "D6P15," Row "TOTAL OPERATING EXP" or "TOTAL OPERATING EXPENSE," Columns "C13" and "C21"; Tab "D8P7B," Columns "C1" and "C5."

Figure 6. Car Mile and Car Day Reductions, URCS Unit Costs, and Estimated Cost Savings⁴⁷

		UP	NS
<u>Panel I: Car Miles and Car Days Operating Reductions</u>			
[A]	Railroad-Owned Car Miles in the Base Plan	2,083,574,474	1,097,172,595
[B]	Railroad-Owned Car Miles in the Optimized Plan	2,079,230,050	1,096,543,206
[C] = [A] - [B]	Railroad-Owned Car Miles Saved	4,344,423	629,390
[D]	Average Car Miles Per Car Day	585.3	512.4
[E] = [C] / [D]	Railroad-Owned Car Days Saved	7,422	1,228
<u>Panel II: Estimated Cost Savings</u>			
[F]	Railroad-Owned Car Miles Running	-\$95,338	\$299,724
[G]	Railroad-Owned Car Days Running	-\$20,158	\$63,379
[H] = [F] + [G]	Total Car Miles and Car Days Cost Savings	-\$115,496	\$363,103
[I] = Sum of [H] Combined Car Miles and Car Days Cost Savings		\$247,607	

5. *Switches and intermodal lifts*

35. Switching is the process of using locomotives and switch engines to move and assemble railcars, typically within a terminal or yard. URCS classifies switches into three categories: (1) industry switches that occur at origin or termination points; (2) interchange switches that occur at intermediate yards between different carriers; and (3) intratrain and intertrain (“I&I”) switches that occur at intermediate points on a rail carrier’s own lines.⁴⁸

36. *First*, improved efficiency of the combined network will lead to a reduction in industry switches, reflected in fewer originations and terminations in the Optimized Plan relative to the Base Plan.⁴⁹ This reduction in originations and terminations is due to a reduction in

⁴⁷ See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

⁴⁸ URCS User Manual, pp. 5, 36.

⁴⁹ See Op. Plan Workpapers, “HC-Yard Details T1 vFinal.xlsx,” Tab “Yard_Output_T1,” Columns E:H; “HC-Yard Details T2 vFinal.xlsx,” Tab “Yard_Output_T2_Addback,” Columns E:H.

“rubber tire” interchanges of intermodal shipments (*i.e.*, truck transfers between yards or terminals) between UP and NS.⁵⁰ Because eliminating a rubber tire interchange between UP and NS removes industry switches for both the delivering railroad (which unloads intermodal shipments to drayage trucks) and the receiving railroad (which loads those shipments from the drayage trucks), we apply the industry switch reduction to both UP and NS when estimating operating cost savings.⁵¹ Because URCS measures industry switches at the car level—*i.e.*, one industry switch corresponds to one car switched at an origin or termination point—**Figure 7** (Panel I) shows reductions of 27,683 industry switches for legacy UP and 27,683 industry switches for legacy NS, resulting in a combined reduction of 55,367 industry switches, measured by the number of cars switched.

37. *Second*, many interchange switches between UP and NS (separate from the “rubber tire” interchanges that we classify as industry switches above) will be either eliminated or converted to more efficient I&I switches in the Optimized Plan relative to the Base Plan.⁵² When URCS costs an interchange switch, it only includes the switching cost incurred by the delivering railroad *or* the receiving railroad, depending on which leg of the shipment is being costed. Because eliminating an interchange between UP and NS reduces interchange switching costs for *both* the delivering railroad and the receiving railroad, we apply the interchange

⁵⁰ See Op. Plan Workpaper, “HC-NS-UP Interchange Summary by Gateway vFinal.xlsx,” Tab “RIC Conv Summary,” Column T. Our savings do not include the cost to dray a container from the first ramp to the second ramp, which is not included within URCS. Union Pacific separately quantifies savings from such costs in the Verified Statement of Grant Janke. See Verified Statement of Grant Janke, ¶ 30.

⁵¹ Because rubber tire interchanges require loading and off-loading to trucks and generate originations and terminations, they are appropriately classified as industry switches.

⁵² See Op. Plan Workpaper, “HC-Yard Details T1 vFinal.xlsx,” Tab “Yard_Output_T1,” Columns J:K.

reduction to *both* UP and NS when estimating operating cost savings. **Figure 8** (Panel I) shows reductions of 346,985 interchange switches for both legacy UP and legacy NS.

38. *Third*, improved efficiency of the combined network will reduce I&I switches in the Optimized Plan relative to the Base Plan.⁵³ I&I switches occur within a single railroad's network, so unlike interchanges, I&I switch reductions are allocated based on whether they occur on the legacy UP network or legacy NS network. **Figure 9** (Panel I) shows an increase of 31,943 I&I switches for legacy UP and a reduction of 164,585 I&I switches for legacy NS, resulting in a combined net reduction of 132,643 I&I switches. We understand the increase of I&I switches for legacy UP reflects a shift in I&I switches from the legacy NS network to the legacy UP network under the Optimized Plan.

39. URCS estimates costs associated with switches by converting switching events (measured by the number of cars that are switched) into switch engine minutes ("SEMs") and applying unit costs to the SEMs.⁵⁴ Our calculation of operating cost savings from reduced industry, interchange, and I&I switches includes all variable OPR unit costs that URCS associates with SEMs, except those related to road operations and below-the-wheel costs. Specifically, we include URCS unit costs for "SEM Yard Operations" (e.g., switch crews and locomotive fuel used in yard operations),⁵⁵ and exclude URCS unit costs for "SEM Road Operations" (e.g., train crews, diesel road locomotive repairs)⁵⁶ and "Switching Track

⁵³ See Op. Plan Workpapers, "HC-Yard Details T1 vFinal.xlsx," Tab "Yard_Output_T1," Columns I and O; "HC-Yard Details T2 vFinal.xlsx," Tab "Auto_Handling_Addback," Cells F14:F15; "HC-Yard Details T2 vFinal.xlsx," Tab "Yard_Output_T2," Column J.

⁵⁴ See URCS Phase II Worktables, Tab "E2P1," Columns "C25," "C26," and "C29." See also, URCS Phase III Model, Tab "RailroadCostProgram," Rows 130:150.

⁵⁵ See URCS Phase II Worktables, Tab "D4P1," Column "C10," Cells D4L159C10 and D8L722C1.

⁵⁶ See URCS Phase II Worktables, Tab "D3P1," Column "C40," Cells D3L191C40 and D8L721C1.

Ownership and Maintenance” (e.g., rails and other track material, signals and interlockers, and roadway).⁵⁷ We exclude “SEM Road Operations” costs because we understand that MultiRail’s Yard Output—our source for switch reduction estimates—reports only switches occurring in yards and does not capture road switching. We exclude “Switching Track Ownership and Maintenance” costs to remain conservative and to avoid any double counting, as Grant Janke separately quantifies savings associated with yard rationalization synergies in his verified statement.⁵⁸

40. For originations and terminations (*i.e.*, industry switches) of intermodal traffic, URCS also estimates costs associated with intermodal lifts (*i.e.*, loading and unloading trailers/containers) in addition to costs associated with SEMs.⁵⁹ Therefore, our calculation of operating cost savings also accounts for savings in intermodal lifts associated with the reduction in rubber tire interchanges. We include only the “Loading & Unloading” component of the intermodal lift cost per trailer/container in URCS.⁶⁰ We exclude the other components of the URCS intermodal lift costs, which include trailer-on-flatcar/container-on-flatcar terminal repair expenses and various other “Ways and Structures” expenses, as to remain conservative and to avoid any double counting, as Grant Janke separately quantifies savings associated with yard rationalization synergies in his verified statement.⁶¹ Because URCS allocates the costs of intermodal lifts on a per-container basis, we calculate total loading and unloading savings by multiplying the URCS unit cost per container by the number of intermodal containers that no

⁵⁷ See URCS Phase II Worktables, Tab “D2P1,” Column “C10,” Cells D2L159C10 and D8L720C1.

⁵⁸ See Verified Statement of Grant Janke, ¶ 55.

⁵⁹ See URCS Phase II Worktables, Tab “D7P7A.”

⁶⁰ URCS Phase II Worktables, Cell D7L701C8.

⁶¹ See Verified Statement of Grant Janke, ¶ 55; URCS Phase II Worktables, Tabs “A2P1” and “D7P7A.”

longer require rubber tire interchanges between UP and NS under the Optimized Plan, relative to the Base Plan.⁶² Consistent with our treatment of rubber tire interchanges, we apply the intermodal lift reduction to both UP and NS when estimating operating cost savings. **Figure 10** (Panel I) shows reductions of 129,384 intermodal lifts for legacy UP and 129,384 intermodal lifts for legacy NS, resulting in a combined reduction of 258,768 intermodal lifts.⁶³

41. **Figure 7** (Panel III) reports industry switch cost savings of \$484,337 for legacy UP and \$543,879 for legacy NS, for a combined savings of \$1,028,216. **Figure 8** (Panel III) reports interchange switch cost savings of \$3,338,884 for legacy UP and \$3,749,348 for legacy NS, for a combined savings of \$7,088,232. **Figure 9** (Panel III) reports I&I switch cost savings of *negative* \$139,714 for legacy UP and \$808,377 for legacy NS, for a combined savings of \$668,663. **Figure 10** (Panel III) reports intermodal lift savings of \$5,968,982 for legacy UP and \$6,088,834 for legacy NS, for a combined savings of \$12,057,816.

⁶² Since each container that is interchanged via rubber tire between the two railroads requires a loading by UP and an unloading by NS (or vice versa), we apply each of the UP and NS loading and unloading intermodal lift unit costs to the number of containers that no longer need to be interchanged via rubber tire in the Optimized Plan. See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

⁶³ See Op. Plan Workpaper, “HC-NS-UP Interchange Summary by Gateway vFinal.xlsx,” Tab “RIC Conv Summary,” Column U.

Figure 7. Industry Switch Reductions, URCS Unit Costs, and Estimated Cost Savings⁶⁴

		UP	NS
<u>Panel I: Industry Switch Operating Reductions</u>			
[A]	Industry Switches Saved	27,683	27,683
[B]	SEM per Industry Event	4.22	6.76
[C] = [A] * [B]	Total SEMs Saved	116,786	187,088
<u>Panel II: URCS Unit Costs</u>			
[D]	SEM - Yard Operations	\$4.15	\$2.91
<u>Panel III: Estimated Cost Savings</u>			
[E] = [C] * [D]	Industry Switch Savings	\$484,337	\$543,879
[F] = Sum of [E] Combined Industry Switch Savings		\$1,028,216	

Figure 8. Interchange Switch Reductions, URCS Unit Costs, and Estimated Cost Savings⁶⁵

		UP	NS
<u>Panel I: Interchange Switch Operating Reductions</u>			
[A]	Interchange Switches Saved	346,985	346,985
[B]	SEM per Interchange Event	2.32	3.72
[C] = [A] * [B]	Total SEMs Saved	805,091	1,289,733
<u>Panel II: URCS Unit Costs</u>			
[D]	SEM - Yard Operations	\$4.15	\$2.91
<u>Panel III: Estimated Cost Savings</u>			
[E] = [C] * [D]	Interchange Switch Savings	\$3,338,884	\$3,749,348
[F] = Sum of [E] Combined Interchange Switch Savings		\$7,088,232	

⁶⁴ See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

⁶⁵ See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

Figure 9. I&I Switch Reductions, URCS Unit Costs, and Estimated Cost Savings⁶⁶

		UP	NS
<u>Panel I: I&I Switch Operating Reductions</u>			
[A]	I&I Switches in the Base Plan	16,156,686	10,982,999
[B]	I&I Switches in the Optimized Plan	16,188,629	10,818,414
[C] = [A] - [B]	I&I Switches Saved	-31,943	164,585
[D]	SEM per I&I Event	1.05	1.69
[E] = [C] * [D]	Total SEMs Saved	-33,689	278,072
<u>Panel II: URCS Unit Costs</u>			
[F]	SEM - Yard Operations	\$4.15	\$2.91
<u>Panel III: Estimated Cost Savings</u>			
[G] = [E] * [F]	I&I Switch Savings	-\$139,714	\$808,377
[H] = Sum of [G] Combined I&I Switch Savings		\$668,663	

Figure 10. Intermodal Lift Reductions, URCS Unit Costs, and Estimated Cost Savings⁶⁷

		UP	NS
<u>Panel I: Intermodal Lift Operating Reductions</u>			
[A]	Intermodal Lift Reductions	129,384	129,384
<u>Panel II: URCS Unit Costs</u>			
[B]	Loading & Unloading Trailer/Container Unit	\$46.13	\$47.06
<u>Panel III: Estimated Cost Savings</u>			
[C] = [A] * [B]	Intermodal Lift Savings	\$5,968,982	\$6,088,834
[D] = Sum of [C] Combined Intermodal Lift Savings		\$12,057,816	

C. Total operating cost savings

42. **Figure 11** summarizes total operating cost savings due to system-wide operating efficiencies for legacy UP, legacy NS, and the combined network. We estimate operating cost savings of \$43.25 million for legacy UP, \$34.27 million for legacy NS, and \$77.52 million for the combined network.

⁶⁶ See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

⁶⁷ See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

Figure 11. Summary of Total Operating Cost Savings due to System-Wide Operating Efficiencies (in 2023 USD Millions)⁶⁸

	UP	NS	UP + NS
[A] Train Miles	\$8.90	\$13.57	\$22.47
[B] LUMs	\$13.57	\$14.54	\$28.11
[C] GTMs	\$11.24	-\$5.39	\$5.85
[D] Car Miles	-\$0.10	\$0.30	\$0.20
[E] Car Days	-\$0.02	\$0.06	\$0.04
[F] Industry Switches	\$0.48	\$0.54	\$1.03
[G] Interchange Switches	\$3.34	\$3.75	\$7.09
[H] I&I Switches	-\$0.14	\$0.81	\$0.67
[I] Intermodal Lifts	\$5.97	\$6.09	\$12.06
[J] Total	\$43.25	\$34.27	\$77.52

V. INCREASES IN OPERATING COSTS FROM DIVERTED TRAFFIC

43. We have been asked to quantify increase in operating costs due to the additional traffic the combined network would attract in the Growth Plan from extended hauls, rail-to-rail diversions, and truck-to-rail diversions, which we estimate using URCS Phase III.

44. Because the diverted traffic will operate on the combined network, it is reasonable and appropriate from an economic perspective to model the post-merger operating cost structure of the combined entity when estimating the associated operating costs.⁶⁹ To do so, we first develop a combined URCS Phase II model to estimate system-average variable unit costs for the post-merger entity (*see Section V.A*). We then adjust the URCS model to remove certain cost

⁶⁸ See Workpaper “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx.”

⁶⁹ In contrast, when estimating operating cost savings in **Section IV**, we apply the pre-merger UP unit costs to reductions in operating metrics that occur on legacy UP, and pre-merger NS unit costs to reductions in operating metrics that occur on legacy NS. This is because our operating cost savings estimates in **Section IV** represent savings that would be expected to be realized relative to the scenario in which the entities do not merge and retain their individual cost structures. In this section, we estimate the costs of additional traffic that would be incurred if the merger were to occur, and as such, it is appropriate to model the combined operating cost structure of the post-merger entity.

categories that are either separately analyzed by other witnesses (to avoid double counting) or that do not reflect operating expenses typically reported in railroads' financial statements (*see* **Section V.B**). Finally, we apply the adjusted model in URCS Phase III to the incremental traffic identified in the Growth Plan to estimate the variable costs associated with the diverted traffic (*see* **Section V.C**).

A. Development of URCS model for combined entity

45. Because the diverted traffic will operate on the post-merger network, it is first necessary to model an appropriate operating cost structure for the combined entity. To do so, we develop a combined 2023 UP/NS URCS Phase II model by analyzing and combining the inputs to the individual UP and NS 2023 URCS Phase II Worktables.

46. The inputs to the Phase II model are summarized in the “A” tables of the worktables published by the Board.⁷⁰ The most common source for the inputs to the URCS Phase II model is data reported in each railroad's R-1 annual report, which report system-wide total operating metrics and expense items.⁷¹ For example, URCS Phase II uses R-1 annual report data on system-wide total operating metrics such as total GTMs and total train miles, and system-wide expense items such as total salaries and wages associated with engine and train crews, and total locomotive fuel expenses.⁷² To calculate these inputs for the combined UP/NS entity, we

⁷⁰ The “A” tables refer to the tabs in the URCS Phase II Worktables starting with the letter “A.” In Workpaper “Boyles-Mathur Workpaper 02 - Collect UP and NS 2023 Phase II A Table Inputs.py,” we populate all of the UP and NS input values from all the “A” tables of each railroad's 2023 Phase II Worktable into a single table. In Workpaper “Boyles-Mathur Workpaper 03 - Combined UP-NS Phase II A Table Input Values.xlsx,” we record our treatment for combining each of these inputs for the purposes of creating a combined UP/NS Phase II URCS model (*e.g.*, summation, weighted average, etc.).

⁷¹ Specifically, the URCS Phase II model relies on railroad-specific data from the past five R-1 annual reports (*i.e.*, 2019-2023 for the 2023 URCS Phase II Worktables). *See, e.g.*, UP 2023 URCS Phase II Worktable, Tab “A1P1”; NS 2023 URCS Phase II Worktable, Tab “A1P1.”

⁷² *See* URCS Phase II Worktables, Tabs “A1P1” and “A2P3.”

sum the corresponding values from the individual UP and NS R-1 annual reports. We sum these inputs when modeling the combined entity's cost structure because the combined entity will integrate the total traffic and expenses of both legacy networks.⁷³

47. However, for other inputs to the combined Phase II model—particularly those that are not railroad-specific or do not reflect system-wide aggregate statistics—it is inappropriate to sum the UP and NS values. For example, certain inputs to the Phase II model, such as the Association of American Railroads (“AAR”) cost indexes, reflect indexes that are specific to where the railroad operates (*i.e.*, regional values) and are not additive.⁷⁴ Therefore, to estimate the corresponding input for the combined entity, we take a weighted average of the UP and NS individual inputs, weighting by legacy UP and legacy NS 2023 total system GTMs.^{75,76} Additionally, there are certain inputs to the Phase II model, such as the STB’s 2023 cost of capital and the “Loss & Damage” values, that are industry-wide values.⁷⁷ In those cases, we apply the same, industry-wide value when modeling the combined entity.

⁷³ Similarly, we sum other inputs that are railroad-specific, total system-wide metrics. For example, we sum the total system-wide originations and terminations by car type of UP and NS that the Phase II model uses from the Quarterly Commodity Statistics. *See* URCS Phase II Worktables, Tab “A1P6”; Workpaper “Boyles-Mathur Workpaper 03 - Combined UP-NS Phase II A Table Input Values.xlsx.”

⁷⁴ *See, e.g.*, URCS Phase II Worktables, Tab “A2P1.”

⁷⁵ There were approximately 905 billion and 361 billion system-wide GTMs on UP’s and NS’s networks in 2023, respectively, which correspond to weights of approximately 72 percent for UP and 28 percent for NS. *See* UP 2023 URCS Phase II Worktable, Cell A1L123C1; NS 2023 URCS Phase II Worktable, Cell A1L123C1; Workpaper “Boyles-Mathur Workpaper 03 - Combined UP-NS Phase II A Table Input Values.xlsx.”

⁷⁶ In the URCS Phase II Worktables, the AAR cost index value for a given railroad may be recorded as zero if the corresponding expense item that the index is applied to in the “A” tables is zero for that railroad. *See, e.g.*, UP 2023 URCS Phase II Worktables, Cells A2L130C2 and A2L130C3. In cases where one of the UP or NS AAR cost index values were zero for this reason while the other was non-zero, we set the corresponding AAR cost index input for the combined UP/NS to be equal to the non-zero input value. *See* Workpaper “Boyles-Mathur Workpaper 03 - Combined UP-NS Phase II A Table Input Values.xlsx.”

⁷⁷ *See* URCS Phase II Worktables, Tab “A1P4” and Cell A4L205C1.

48. After determining the appropriate method for combining each input to the Phase II model for the combined UP/NS entity, we enter the resulting values into the “A” tables of the URCS Phase II model.⁷⁸ The Phase II model then automatically calculates the unit costs of the combined entity. The resulting variable unit costs calculated in the “D” and “E” tables of the Phase II model reflect our estimates of the variable unit costs of the combined UP/NS entity. We then apply those unit costs in the URCS Phase III model to estimate the operating costs associated with the diverted traffic.^{79,80}

49. The variable unit costs produced by our model for the combined entity are approximately equivalent to a weighted average of the legacy UP and legacy NS variable unit costs.⁸¹ The legacy UP and NS cost structures reflect differences in geography, operating conditions, and traffic mix. Therefore, using a weighted-average UP/NS cost structure to

⁷⁸ See Workpaper “Boyles-Mathur Workpaper 04 - Combined UP-NS Phase II Worktable.xlsm.”

⁷⁹ For certain unit costs that are outputted in the “E” tables of the railroads’ Phase II Worktables, the Board applies “substitutions,” specifying alternative values to be used in the Phase III model when the initial values from the Phase II model are outside a reasonable range. In cases where the Board substituted a given unit cost for UP and NS with a different unit cost from the same railroad’s Phase II model, we applied the same substitution for the combined UP/NS Phase II unit cost prior to costing the diverted traffic using the Phase III model. In cases where the Board substituted a given unit cost with a value from a different railroad’s Phase II unit cost for both UP and NS (*e.g.*, cases where UP’s unit cost was substituted with a “WEST” value and NS’s unit cost was substituted with an “EAST” value), we took a weighted average of the substituted values for both UP and NS (based on legacy UP and legacy NS system-wide GTMs) to calculate the substituted value for the combined UP/NS Phase II unit cost. See Workpaper “Boyles-Mathur Workpaper 05 - Combined UP-NS E Summary with Substitutions.xlsx”; “URCS2023_U_SUBSTITUTIONS.xlsx,” downloaded from: “Uniform Rail Costing System (URCS),” *Surface Transportation Board*, available at <https://www.stb.gov/reports-data/uniform-rail-costing-system/> (at link “URCS 2023 Substitutions”), accessed November 20, 2025.

⁸⁰ There are certain “residual factors” used in the Phase III model that are not directly calculated in the Phase II model’s unit costs (these factors have “E” codes starting with “E2L3” in URCS). These residual factors are calculated annually when the Board costs the waybill sample. To calculate these residual factors for the combined UP/NS, we calculated a weighted average of the legacy UP and legacy NS 2023 factors found in the Board’s Phase III model, weighting by system-wide GTMs. See Workpaper “Boyles-Mathur Workpaper 05 - Combined UP-NS E Summary with Substitutions.xlsx”; URCS Phase III Model, Tabs “RailroadUnitCostXML” and “ECodeTable.”

⁸¹ This methodology is conservative and does not account for cost efficiencies that would be expected to be achieved as a result of the merger, which would lower certain URCS unit costs relative the combined pre-merger UP and NS cost structure.

estimate the costs of the diverted traffic assumes that the geographical and operational characteristics of the diverted traffic are generally consistent with those of the combined network (*i.e.*, a weighted average of the legacy UP and NS networks). This assumption is reasonable because it is consistent with the methodology that URCS typically uses for calculating railroad costs on a regional basis.⁸²

B. Adjustments to URCS to account for cost categories estimated by other witnesses, and removal of ROI expense

50. Next, we make adjustments to the combined UP/NS URCS model to account for cost categories that are separately quantified by other witnesses, and to remove ROI expenses.

51. First, we make targeted adjustments to the combined UP/NS URCS Phase II model to avoid double counting costs that are already accounted for in the *pro forma* financial statement by another witness's cost estimates. In particular, Grant Janke estimates the capital and capacity investments that the combined UP/NS entity would incur to accommodate the diverted traffic.⁸³ These estimates are separately incorporated into the *pro forma* income statement through the associated depreciation and amortization of the investments.⁸⁴ Therefore, we exclude costs associated with depreciation from our URCS costing analysis to avoid "double counting"

⁸² See URCS User Manual, p. 1 ("URCS uses an accounting based approach to costing, relying on annual operating expenses and traffic data reported by the railroads. This approach provides cost estimates on the average cost structure of individual railroads or regionalized groups of railroads. Average data on average railroad moves may not, in all cases, be appropriate for estimating a cost for a given railroad movement.").

⁸³ Verified Statement of Grant Janke, ¶ 18 ("Applicants expect UP/NS will spend \$959.9 million to add capacity to the combined network in support of additional traffic. Capacity spending includes investment along UP/NS main lines to construct second main track, extend sidings, and improve signal systems. It also includes investments across the UP/NS network to increase capacity at a number of manifest yards, intermodal terminals, and automotive terminals. Finally, capacity spending includes investments to upgrade UP/NS's refrigerated box car fleet to move traffic identified in the Growth Plan.").

⁸⁴ App. Vol 1, App'x F; Notes to Pro Forma Income Statement, Year One through Normal Year, Note 2 ("Depreciation & amortization - Represents the increased depreciation expense as a result of capital spending necessary to combine operations of UPC and NSC.").

the impacts of depreciation costs estimated by other witnesses. We do not exclude costs associated with rents and leases—which, together with depreciation, make up URCS cost category DRL—because, insofar such costs are incurred to accommodate the diverted traffic, they are not separately accounted for by other witnesses.⁸⁵

52. Second, we remove URCS cost categories related to ROI. As we explain in **Section IV.B**, ROI costs do not reflect actual operating expenses reported by railroads in their financial statements. They are an imputed category within URCS that represents a reasonable return on capital investments. Specifically, URCS calculates ROI by applying the Board’s annual determined cost-of-capital percentage to a railroad’s investment expenses.⁸⁶ These imputed costs are layered on top of the OPR and DRL unit costs, which already reflect the operating expenses reported in railroad financials. Because our estimates reflect the impact of the incremental traffic on UP/NS’s financial statements from an operating cost perspective, it is appropriate to exclude these URCS-imputed ROI costs.⁸⁷

53. Finally, we note that we include the general overhead and administrative cost allocation that URCS applies when estimating the cost of individual shipments. We understand that Grant Janke quantifies savings from reductions in general overhead and administrative costs from combining operations of UP and NS without accounting for growth.⁸⁸ However, when

⁸⁵ For example, we understand that some diverted traffic, including intermodal traffic, may move on cars rented or leased from TTX. TTX is a railcar pooling company that owns and provides railcars to railroads for shipment. See “About TTX,” *TTX*, available at <https://www.ttx.com/about/who-we-are/>, accessed November 11, 2023. To only remove the depreciation component from the total DRL expense reported in URCS, we excluded all line items in the “D” tabs of the combined UP/NS URCS Phase II Worktable corresponding to depreciation. See Workpaper “Boyles-Mathur Workpaper 04 - Combined UP-NS Phase II Worktable.xlsm.”

⁸⁶ The cost-of-capital percentage is applied in the “B” tables of the URCS Phase II Worktables. See URCS Phase II Worktables, Tabs “B5P6” and “B5P7.”

⁸⁷ We exclude these ROI costs after we run the URCS Phase III Model to estimate the variable costs associated with the diverted traffic. See **Section V.C**.

⁸⁸ See Verified Statement of Grant Janke, ¶¶ 8, 19, and 22.

accounting for the additional traffic the combined network would attract, it is reasonable (and conservative) to assume that the combined UP/NS entity's general overhead and administrative costs increase to support the diverted traffic.

C. Application of combined adjusted URCS model to diverted traffic

54. We received data on diverted traffic from extended hauls, rail-to-rail diversions, and truck-to-rail diversions that are projected to occur on the combined UP/NS network from the Verified Statement of David T. Hunt. The data include the following fields:

- a. The origin and destination of the diverted traffic.
- b. The distance between the origin and destination that the diverted traffic will travel on the combined UP/NS network, as calculated by MultiRail.
- c. The service type of the diverted traffic (*i.e.*, whether it is intermodal, bulk, auto, or general merchandise traffic).
- d. The commodity of the diverted shipments, represented by the two-digit Standard Transportation Commodity Code ("STCC").⁸⁹
- e. The freight car type that the diverted traffic travels on, represented by the first letter of the AAR equipment type.⁹⁰
- f. The "junction frequency," which can have a value of 0, 1, or 2, and indicates the number of interchanges with other railroads at both ends of the diverted

⁸⁹ See "2023 Surface Transportation Board Carload Waybill Sample Reference Guide," March 5, 2025, available at <https://www.stb.gov/wp-content/uploads/2023-STB-Waybill-Reference-Guide.pdf> ("2023 Waybill Sample Reference Guide"), p. 107.

⁹⁰ See 2023 Waybill Sample Reference Guide, pp. 62, 162–163.

traffic's journey on the UP/NS network. Specifically, a value of 0 indicates that the traffic originates and terminates on the UP/NS network, a value of 1 indicates that it originates or terminates on the UP/NS network at one end and interchanges with another railroad at the other, and a value of 2 indicates that it interchanges with other railroads at both ends.

- g. The total number of cars (or intermodal units, for intermodal service type) expected to be diverted in a year for the given origin-destination-service type-commodity-car type combination.
- h. The total net weight of the shipments that are diverted for each origin-destination-service type-commodity-car type combination.⁹¹

55. The diverted traffic includes both traffic that previously traveled exclusively on other railroads or via trucks for its entire journey, and “extended haul” diversions—*i.e.*, traffic that traveled over a portion of the UP or NS network pre-merger. For extended haul diversions, we received the same data fields for “offsetting” traffic, *i.e.*, the original routing as it would occur on either legacy UP or legacy NS prior to the merger.

56. We applied certain transformations to these data fields to convert them into the inputs necessary to run the diverted traffic through our URCS Phase III model. Specifically, the

⁹¹ “Net weight” refers to only the weight of the commodity being transported itself and excludes the tare weight of the cars and equipment used to move the commodity. *See* URCS Phase III Model, Tab “RailroadCostProgram,” Rows 11, 48:55.

URCS Phase III model requires nine inputs for estimating operating costs,⁹² which we calculate as follows:

- a. Distance: We obtain this field directly from the diverted traffic data based on the distance between the origin and the destination.
- b. Segment Type: This input to the URCS Phase III model determines whether URCS assumes the shipment has two industry switches (*i.e.*, an origination and a termination), two interchange switches (*i.e.*, interchanges to another railroad at both ends of its journey), or one of each type of switch. We map the “junction frequency” field in the diverted traffic data into this URCS input.⁹³
- c. Freight Car Type: The diverted traffic data identify freight car type by the first letter of the AAR equipment code. However, the URCS model classifies car types differently from the AAR classification—URCS car type classifications are consistent with those used in Schedule 710 of the R-1 annual reports. In most cases, the first letter of the AAR equipment code corresponds directly to one URCS car type, allowing for a straightforward mapping.⁹⁴ However, in

⁹² See URCS Phase III Model, Tab “RailroadCostProgram,” Rows 5:13.

⁹³ Specifically, if junction frequency equals zero, we set segment type to “OT,” signifying an origination and termination on both ends of the movement. If junction frequency equals one, we set segment type to “OD,” signifying an origination on one end and an interchange (*i.e.*, delivery) on the other end. If junction frequency equals two, we set segment type to “RD,” signifying received and delivered (*i.e.*, an interchange on both ends). For cases where junction frequency equals one, we could have also set the segment type to be “RT,” which reflects “received” (*i.e.*, an interchange) at the beginning and a termination at the end. Because URCS treats shipments with segment type of “OD” and segment type of “RT” as having an interchange on one end and an origination or termination on the other, both segment types have the same cost estimates. See URCS Phase III Model, Tab “RailroadCostProgram.”

⁹⁴ See R-1 Annual Report, Schedule 710, pp. 68, 70. For instance, there is a one-to-one mapping between AAR equipment code letter “C” and URCS car type covered hopper cars. Therefore, we assign URCS car type covered hopper cars to all observations with AAR equipment code letter “C.”

cases where the first letter of an AAR equipment code corresponds to multiple URCS car types, we assign the URCS car type associated with the greatest combined UP/NS car miles among the possible options.⁹⁵

- d. Shipment Size: In URCS, the shipment size field can take on values of single-car, multi-car, unit train, or intermodal. The URCS Phase III model estimates proportionally lower costs per car for larger shipment sizes (*i.e.*, multi-car and unit train shipment sizes relative to single-car shipment size) and for intermodal shipments.⁹⁶ We determine the shipment size based on the service type field of the diversion traffic data. To be conservative, we assume “merchandise” and “auto” service types correspond to single-car shipment sizes. We assign “bulk” service type to “unit train” shipment size, and “intermodal” service type to “intermodal” shipment size.⁹⁷
- e. Number of Cars: The URCS input for number of cars is meant to correspond to the number of cars in the specific shipment. The diverted traffic data, however, report the total number of cars diverted over the entire year, and

⁹⁵ For instance, letter “T” of the AAR equipment code corresponds to two URCS car types, namely tank cars under 22,000 gallons and tank cars 22,000 gallons and over. The Board’s URCS Phase II Worktables show that in 2023, the UP/NS combined total car miles for tank cars 22,000 gallons and over was 1.8 million, higher than the UP/NS combined total car miles for tank cars under 22,000 gallons at 0.5 million. Therefore, we assign the URCS car type tank cars 22,000 gallons and over to all observations with AAR equipment code letter “T.” See Workpaper “Boyles-Mathur Workpaper 06 - AAR to URCS Car Type Crosswalk for Diverted Traffic Analysis.xlsx.”

⁹⁶ The efficiency adjustments and jurisdictional add-ons in the URCS Phase III model reflect economies of scale present in railroad operations. Specifically, the efficiency adjustments apply relatively lower unit costs within certain cost categories for larger shipment sizes and intermodal shipments, while conversely, the jurisdictional add-ons increase the costs that are calculated by URCS for smaller shipment sizes. See URCS Phase III Model, Tab “DetailedParameters,” Rows 88 and 90, Tab “URCSInputs,” Columns AU:AZ; Tab “RailroadCostProgram,” Rows 131:150 and 352:368. We apply the URCS efficiency adjustments and jurisdictional add-ons when calculating the costs associated with the diverted traffic, as is recommended by the Board. See URCS User Manual, p. 23.

⁹⁷ See Workpaper “Boyles-Mathur Workpaper 07 - Diverted Traffic Data Processing - URCS Phase III Input.R.”

does not contain data on the number of cars in a shipment. Therefore, to be conservative and consistent with our treatment of the “shipment size” variable described above, we assume that the diverted traffic with service types of auto and merchandise are single car shipments and we assume that the diverted traffic with intermodal service type are single intermodal container/trailer shipments. Thus, for these three service types, we set the number of cars or intermodal units equal to one. For the bulk service type, we set the number of cars to be the weighted average number of cars per unit train for UP and NS based on their 2023 R-1 annual reports, which is approximately 122 cars.⁹⁸ To estimate the variable costs associated with the total cars or intermodal units diverted over an entire year, we multiply the URCS output for a single-car (or for bulk traffic, 122-car) shipment by the total number of cars or intermodal units diverted in the diverted traffic data (or the total number of cars divided by 122 for bulk traffic).

- f. Commodity: Because the URCS commodity input translates to two-digit STCC codes, we directly use the STCC field available in the diverted traffic data.⁹⁹

⁹⁸ Specifically, the system-wide unit train miles reported in UP and NS’s 2023 R-1 annual reports were 21,465,276 and 7,191,823, respectively, totaling 28,657,099 unit train miles across both networks. The system-wide car miles on unit trains reported in UP and NS’s 2023 R-1 annual reports were 2,735,550,000 and 772,092,000, respectively, totaling 3,507,642,000 car miles on unit trains across both networks. Therefore, the weighted average cars per unit train across both networks is 3,507,642,000 car miles divided by 28,657,099 train miles, which is approximately 122 cars per unit train. *See* UP 2023 R-1 Annual Report, Schedule 755; NS 2023 R-1 Annual Report, Schedule 755.

⁹⁹ There are three STCC code values that appear in the diverted traffic data that the URCS Phase III model does not accept as an input for the commodity field. For codes 0 and 99, which only occur for intermodal offsetting traffic, we use STCC code 46, which represents miscellaneous mixed shipments and is the most common STCC code assigned to intermodal traffic in the non-offsetting diverted traffic data. For STCC code 49, corresponding

- g. Car Ownership: The diverted traffic data do not include information on car ownership (*i.e.*, railroad-owned versus privately-owned). However, we were separately provided a file that shows the distribution of car ownership by two-digit STCC and AAR car type.¹⁰⁰ Therefore, for each observation in the diverted traffic data, we assign the ownership type that is most common for the STCC-car type combination of the observation.¹⁰¹
- h. Net Weight per Car: To determine net weight per car (or per intermodal unit) for each observation in the diverted traffic data, we divide the total net weight of the diverted shipments by the total number of diverted cars (or intermodal units).

to hazardous materials, we rely on a lookup table provided by David T. Hunt based on the CCWS that shows the distribution of standard STCC codes by AAR car type for waybills with STCC code 49. Specifically, we use the most common standard STCC code from the lookup table for each AAR car type. *See* 2023 Waybill Sample Reference Guide, p. 158; “Association of American Railroads Hazardous Materials Shipping Descriptions Data Base Reference File Layout,” *Association of American Railroads*, 2021, p. 8, available at https://public.railinc.com/sites/default/files/documents/STCC_HazMatFileLayout.pdf, accessed November 24, 2025; Hunt Workpaper, “HC-Revenue Calculation vFinal.xlsx,” Tab “Lkup_haz_stcc2_car_type”; Workpaper “Boyles-Mathur Workpaper 07 - Diverted Traffic Data Processing - URCS Phase III Input.R”; URCS Phase III Model, Tab “URCSInputs,” Columns O:R.

¹⁰⁰ The distribution was provided to us by David T. Hunt and is based on the CCWS. Hunt Workpaper, “HC-Revenue Calculation vFinal.xlsx,” Tab “Lkup_car_ownership_by_stcc2.” This distribution shows a breakdown of car ownership by railroad-owned, private-owned, and TTX cars. URCS costs TTX cars the same as it costs privately-owned cars, so the TTX and private car percentages were combined when comparing the private car ownership to railroad car ownership and determining which was more common for the given STCC-car type combination. *See* Workpaper “Boyles-Mathur Workpaper 07 - Diverted Traffic Data Processing - URCS Phase III Input.R”; URCS Phase III Model, Tab “URCSInputs,” Columns T:V; Tab “RailroadCostProgram.”

¹⁰¹ The car ownership distribution provided to us did not include all the STCC-car type combinations in the diverted traffic data for AAR equipment code letters “U” and “Z,” which represent intermodal containers and trailers. These containers and trailers are loaded on intermodal flatcars, which have AAR equipment codes “P,” “Q,” or “S.” Because the distribution we were provided shows that the ownership type most common for intermodal flatcars is always private (or TTX) ownership regardless of STCC, we assign private car ownership to AAR equipment code letters “U” and “Z.” *See* Hunt Workpaper, “HC-Revenue Calculation vFinal.xlsx,” Tab “Lkup_car_ownership_by_stcc2”; Workpaper “Boyles-Mathur Workpaper 07 - Diverted Traffic Data Processing - URCS Phase III Input.R”; R-1 Annual Report, pp. 68, 70.

- i. Railroad: The railroad input to the URCS Phase III model determines which railroad's Phase II variable unit costs are applied to estimate the variable costs of the given shipment.¹⁰² We adjust the URCS Phase III model to add a new "UPNS" railroad and incorporate the Phase II unit costs we developed for the combined UP/NS network (as described in **Section V.A**) into the Phase III model.¹⁰³

57. After converting the diverted traffic data into the necessary URCS Phase III inputs, we run the URCS Phase III model using those inputs to estimate the variable costs associated with the diverted traffic. We also run the "offsetting" traffic data (for extended haul diversions) through the model to estimate the variable costs associated with the offsetting traffic to deduct from the variable costs of the diverted traffic. For both the diverted traffic and "offsetting" traffic, we adjust the outputted URCS costs to exclude depreciation costs (which are already separately accounted for in the *pro forma* financials) and exclude ROI expenses, as explained in **Section V.B**.¹⁰⁴ The resulting incremental costs of the diverted traffic are summarized in **Figure 12** below.

¹⁰² See URCS Phase III Model, Tabs "RailroadCostProgram" and "RailroadUnitCostXML."

¹⁰³ See Workpaper "Boyles-Mathur Workpaper 08 - Combined UP-NS Phase III Model - Diverted Traffic Costing.xlsm."

¹⁰⁴ The "jurisdictional add on" and "loss & damage claim" expenses are the two components of the total variable costs that are not explicitly categorized as OPR, DRL, or ROI expenses in the URCS Phase III Model. We include both of these expenses in our estimates of the incremental costs of the diverted traffic. See URCS Phase III Model, Tab "RailroadCostProgram," Rows 368, 465, and 468:469; Workpapers "Boyles-Mathur Workpaper 09 - Phase III Model - Cost Categorization.xlsx"; "Boyles-Mathur Workpaper 10 - Calculate Diverted Traffic Costs from Phase III Output.R."

Figure 12. Incremental Costs of Diverted Traffic¹⁰⁵

	<u>Costs (2023 USD)</u>
Incremental Costs Including Full Extended Haul Shipments	\$2,646,296,943
Incremental Costs for Offsetting Traffic	-\$376,134,513
Incremental Costs of Diverted Traffic	\$2,270,162,430

¹⁰⁵ Workpaper “Boyles-Mathur Workpaper 11 - Backup to Figures - Incremental Costs of Diverted Traffic.xlsx.”

VERIFICATION

I, Michael Boyles, declare under penalty of perjury that the foregoing is true and correct.

Further, I certify that I am qualified and authorized to file this statement.

Executed this 29th day of April, 2026.



I, Divya Mathur, declare under penalty of perjury that the foregoing is true and correct.

Further, I certify that I am qualified and authorized to file this statement.

Executed this 29th day of April, 2026.



Exhibit 1: Railroad-Owned Car Mile Reductions and Cost Savings from the Base Plan to the Optimized Plan

Car Types^[4]	Car Mile Reductions^[1]		Unit Costs^[2]		Cost Savings	
	UP^[3]	NS^[3]	UP	NS	UP	NS
Box 50 FT	28,709	118,092	\$0.020186	\$0.024113	\$580	\$2,848
Box Equipped	-1,028,285	1,568,824	\$0.050291	\$0.065870	-\$51,714	\$103,338
Gondola Plain	-67,184	808,364	\$0.046333	\$0.034096	-\$3,113	\$27,562
Gondola Equipped	-398,311	1,255,413	\$0.042603	\$0.063245	-\$16,969	\$79,398
Hopper Covered	-98,486	947,993	\$0.047321	\$0.094131	-\$4,660	\$89,236
Hopper OTG	14,654	59,804	\$0.047749	\$0.032567	\$700	\$1,948
Hopper OTS	-14,054	2,812	\$0.040416	\$0.113385	-\$568	\$319
Refrig Mech	-165,201	139,335	\$0.093004	\$0.046809	-\$15,364	\$6,522
Refrig NM	-8,470	120,617	\$0.108695	\$0.009062	-\$921	\$1,093
Flat TOFC	5,606,522	-5,734,215	\$0.000001	\$0.019004	\$4	-\$108,975
Flat Multilevel	879,756	409,743	\$0.008462	\$0.101755	\$7,445	\$41,693
Flat General	-837	5,794	\$0.003312	\$0.061013	-\$3	\$354
Flat Other	-408,639	928,898	\$0.026315	\$0.059055	-\$10,753	\$54,856
All Other Car Type	4,250	-2,085	\$0.000000	\$0.223713	\$0	-\$466
Total	4,344,423	629,390	N/A	N/A	-\$95,338	\$299,724

Exhibit 1: Railroad-Owned Car Mile Reductions and Cost Savings from the Base Plan to the Optimized Plan

Notes:

[1] Reductions in car miles represent the difference in railroad-owned car miles between the Base Plan and the Optimized Plan. For each car type and railroad, we estimate railroad-owned car miles by apportioning total car miles reported by MultiRail using the shares of railroad-owned car miles in the 2023 R-1 annual reports.

[2] Unit costs are based on the variable operating expenses per car mile running for railroad-owned cars, excluding general overhead expenses (“GOH”), as reported in UP and NS 2023 URCS Phase II Worktables, Tab “D8P7B,” column “C1.”

[3] For both the Base Plan and Optimized Plan, we were provided the car miles split between the legacy UP and legacy NS networks (by AAR car type first letter) in Operating Plan Workpaper, “C-Car Type Splits vFinal.xlsx,” Tabs “Subregion Output_T1” and “Subregion Output_Addback_T2.” We calculate the legacy UP/NS split by assigning Detroit CSAO, N Jersey CSAO, and S Jersey CSAO subregions to NS and excluding stranded and unmoved blocks. We then use this legacy UP/NS split to allocate the total car miles for each car type reported in Tabs “Output_T1” and “Output_T2_Addback” to UP and NS.

[4] For both the Base Plan and Optimized Plan, MultiRail reports car miles by the first letter of the AAR equipment code. Using Schedule 710 of the R-1 Annual Report, we map each AAR equipment code letter to the corresponding URCS car type. We assign car miles with “Null” AAR equipment code letters to URCS car type “All Other Freight Cars.” For the four AAR equipment code letters (B, F, R and T) that correspond to two URCS car types (excluding “All Other Freight Cars”), we apportion car miles between the two URCS car types in proportion to each railroad’s 2023 R-1 car miles for those types.

Sources:

[1] Operating Plan Workpaper, “C-Car Type Splits vFinal.xlsx,” Tabs “Output_T1,” “Subregion Output_T1,” “Output_T2_Addback,” and “Subregion Output_Addback_T2.”

[2] R-1 Annual Report, Schedule 710.

[3] UP and NS 2023 URCS Phase II Worktables, Tabs “A1P2A” and “A1P2C,” column “C3,” and Tab “D8P7B,” column “C1.”

[4] “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx,” Tabs “CM and CD”, “AAR to URCS Car Type Crosswalk”, and “CM by Car Type and Subregion.”

Exhibit 2: Railroad-Owned Car Day Reductions and Cost Savings from the Base Plan to the Optimized Plan

Car Types	Car Day Reductions ^[1]		Unit Costs ^[2]		Cost Savings	
	UP	NS	UP	NS	UP	NS
Box 50 FT	49	230	\$2.877548	\$2.902162	\$141	\$669
Box Equipped	-1,757	3,062	\$5.485061	\$6.820878	-\$9,636	\$20,885
Gondola Plain	-115	1,578	\$3.895587	\$2.516480	-\$447	\$3,970
Gondola Equipped	-681	2,450	\$5.298877	\$4.974848	-\$3,606	\$12,189
Hopper Covered	-168	1,850	\$5.954352	\$10.179121	-\$1,002	\$18,833
Hopper OTG	25	117	\$3.558893	\$2.137799	\$89	\$250
Hopper OTS	-24	5	\$3.812811	\$4.256644	-\$92	\$23
Refrig Mech	-282	272	\$14.759140	\$6.168352	-\$4,166	\$1,677
Refrig NM	-14	235	\$19.225311	\$1.814380	-\$278	\$427
Flat TOFC	9,579	-11,192	\$0.000051	\$1.595317	\$0	-\$17,854
Flat Multilevel	1,503	800	\$0.353278	\$10.996449	\$531	\$8,794
Flat General	-1	11	\$0.402680	\$6.404577	-\$1	\$72
Flat Other	-698	1,813	\$2.424650	\$7.528799	-\$1,693	\$13,649
All Other Car Type	7	-4	\$0.000000	\$50.778686	\$0	-\$207
Total	7,422	1,228	N/A	N/A	-\$20,158	\$63,379

Exhibit 2: Railroad-Owned Car Day Reductions and Cost Savings from the Base Plan to the Optimized Plan

Notes:

[1] Reductions in car days represent the difference in railroad-owned car days between the Base Plan and the Optimized Plan. For each railroad and URCS car type, we calculate railroad-owned car days as railroad-owned car miles divided by the system-wide average number of miles a car travels per day reported in URCS, following the URCS Phase III methodology. *See* Exhibit 1 for our estimates of reductions in railroad-owned car miles by URCS car type. URCS reports the system-wide average miles a car travels per day as 585.32 for UP and 512.37 for NS.

[2] Unit costs are based on the variable operating expenses per car day running for railroad-owned cars, excluding GOH, as reported in UP and NS 2023 URCS Phase II Worktables, Tab “D8P7B,” column “C5.”

Sources:

[1] Operating Plan Workpaper, “C-Car Type Splits vFinal.xlsx,” Tabs “Output_T1,” “Subregion Output_T1,” “Output_T2_Addback,” and “Subregion Output_Addback_T2.”

[2] Exhibit 1.

[3] URCS Phase III Model, Tab “RailroadCostProgram,” rows 172-204.

[4] UP and NS 2023 URCS Phase II Worktables, Tab “D8P7B,” column “C5,” and Tab “E2P1,” column “C22.”

[5] “Boyles-Mathur Workpaper 01 - Backup to Figures - Operating Cost Savings from Base to Optimized Plan.xlsx,” Tab “CM and CD.”

APPENDIX A

CURRICULUM VITAE OF MICHAEL BOYLES

Michael J. Boyles

Independent Consultant

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m_boyles@hotmail.com

Education

Bachelor of Science and Engineering (B.S.E.) from Princeton University, with a concentration in Engineering and Management Systems.

Summary

Mr. Boyles is a transportation industry expert with more than 35 years of experience conducting economic, financial, cost, and operational analyses in both regulatory and consulting settings – blending qualitative and quantitative approaches.

Work Experience

Mr. Boyles was a Supervisory Transportation Industry Analyst (TIA) in the Office of Economics (OE) at the Surface Transportation Board (STB or Board) with over 20 years of experience before his retirement in September 2025.

Projects related to cost modeling include the following:

- In 2009, he was assigned as Chief of the Section of Regulatory Economics – a new section in OE created to overhaul the STB’s Uniform Rail Costing System (URCS).
- Mr. Boyles was a major contributor to the 2010 Report to Congress Regarding URCS (2010 Report). This included identifying the topics to be included in the Basic, Moderate, and Comprehensive options requested by Congress. The two primary topics were (1) updating the URCS legacy systems and (2) revisiting the Make-Whole Adjustment, which accounts for economies of scale as shipment size increases in the cost of providing railroad service.

- He oversaw an outside IT contractor to update and improve the URCS legacy system available to the public. The new Windows-based version of the URCS Phase III cost program was released to the public in 2012.
- Mr. Boyles was the recipient of the U.S. Department of Transportation Secretary's Team Award, Uniform Railroad Costing System Team, awarded November 2012.
- Mr. Boyles oversaw the development of a new URCS Phase II cost program, which calculates system-average unit costs of certain railroad metrics. The new MS Excel-based version of the URCS Phase II cost program was released to the public in 2015, replacing the previous output from the URCS legacy system. This program for the first time allowed users to change inputs and instantaneously observe the impact of such changes on resulting unit costs (*i.e.*, it added a What-If functionality).
- From 2013 to 2016, he conceptualized and proposed changes to how URCS incorporates cost causation and economies of scale in its development of certain unit costs (*i.e.*, the Make-Whole Adjustment) in Ex Parte No. 431 (Sub-No. 4), Review of the General Purpose Costing System. These proposed changes also eliminated negative step functions in the cost calculations as shipment size increased, which created opportunities for parties to use URCS to manipulate regulatory outcomes. This was the first major proposal to change URCS in over 20 years and addressed issues that stakeholders had complained about for years.
- Mr. Boyles personally developed a new URCS Phase III cost program, which calculates the variable costs of individual rail shipments. The new MS Excel-based version of the URCS Phase III cost program was released to the public in 2021, replacing the URCS legacy program. This new program also made certain technical corrections related to the costing of intermodal shipments, as well as other corrections present in the legacy program.
- He designed and oversaw the development of new programs to calculate the variable cost of shipments in the STB's Confidential Carload Waybill Sample (CCWS) using the new MS Excel-based URCS Phase III cost model. This included corrections to the statistics accumulated from the CCWS used to create the Make-Whole Adjustment factors.

Projects related to economic and regulatory policy/rulemakings include the following:

- In Ex Parte No. 657 (Sub-No. 1), Major Issues in Rail Rate Cases, he was team leader assigned to evaluate evidence regarding the Board's proposal to eliminate movement-specific adjustments to the Uniform Rail Costing System (URCS). He also evaluated the impacts of modifications to how revenues are allocated within a Stand-Alone Cost (SAC) case (*i.e.*, Average Total Cost or ATC) and how reparations are calculated (*i.e.*, Maximum

Markup Methodology or MMM) and recommended how to implement those new methodologies.

- In Ex Parte No. 646 (Sub-No. 1), Simplified Standards for Rail Rate Cases, he was team leader assigned to developing the Board's proposal for estimating railroad operating expenses using URCS in the Simplified SAC methodology for the Notice of Proposed Rulemaking (NPRM). He provided comments on the draft NPRM, including its appendices.
- Mr. Boyles was the recipient of the U.S. Department of Transportation Secretary's Team Award, Small Rate Case Team, awarded November 2005.
- In response to Congressional inquiries, Mr. Boyles provided sensitivity analyses on impacts to the railroad industry from changes to eligibility thresholds applied to each of the three methodologies used by the STB for adjudicating railroad rate complaints.
- As part of the Board's Small Rate Case Team, he participated in meetings hosted by the STB with various railroad executives and railroad unions. He provided the STB Chairman with a summary of the Simplified Stand-Alone Cost (SSAC) model previously sponsored by the AAR in Ex Parte No. 347 (Sub-No. 2), Rate Guidelines - Non-Coal Proceedings. He quantified the rail industry's exposure to the small rate case methodology based on certain proposals contemplated by the Board using the carload waybill sample.

Projects related to railroad rate complaints include the following:

- In Docket No. 41191 (Sub-No. 1), AEP Texas v. BNSF, Mr. Boyles analyzed the traffic volumes and revenues associated with the stand-alone railroad (SARR) traffic group. He summarized the parties' respective positions and shared that economic analysis with the Office of Proceedings for use in a draft decision. He helped evaluate the Rail Traffic Control (RTC) model, particularly with how non-SARR train conflicts at the mines are handled and whether random outages are reasonable, and analyzed the parties' respective positions regarding the Discounted Cash Flow (DCF) model. He proposed, researched and developed an analysis of various railroad cost-of-equity models in defense of the Board's use of a Single-Stage DCF model. This analysis was embraced by the Court of Appeals and ultimately led to the settlement of the case.
- In Docket No. 42088, Western Fuels/Basin Electric v. BNSF, Mr. Boyles compared the parties' respective positions regarding the variable cost analysis. He compared and contrasted how non-SARR train conflicts at the mines were modeled within the WF/BE case versus the AEP Texas case. He reviewed BNSF's Petition for Reconsideration of the

compliance order and compared the use of the EIA's AEO 2006 versus AEO 2005 forecasts with the rate case team.

Projects related to environmental analysis include the following:

- In Finance Docket No. 33407, DM&E Construction into the Powder River Basin (PRB), Mr. Boyles developed the environmental analysis included in the Supplemental Environmental Impact Statement (SEIS) and Final SEIS in response to the remand by the Court of Appeals. He developed new inputs given to the Department of Energy's Energy Information Administration (EIA) for use in its National Energy Modeling System (NEMS) model in order to simulate the air quality impacts of the new construction. He incorporated the results of that simulation into the Supplement SEIS and Final SEIS.
- In Finance Docket No. 30186 (Sub-No. 3), Tongue River Construction and Operation – Western Alignment, Mr. Boyles developed the environmental analysis included in the Final EIS. He worked closely with the applicants, the Office of Environmental Analysis (OEA), and the General Counsel's office.

Prior to joining the STB, Mr. Boyles was a consultant with FTI Consulting in its Network Industries Strategies practice.

Projects related to the railroad industry include the following:

- Mr. Boyles performed a number of railroad special studies used as inputs into the Uniform Railroad Costing System (URCS) and Stand-Alone Cost (SAC) analyses in order to develop costs for rate reasonableness cases before the STB.
- He headed a project team of seven in a contract dispute between Amtrak and a U.S. Class I railroad involving a False Claims Act violation. He evaluated Amtrak's claim and provided analyses and an independent audit of contract provisions and its execution. He supported outside counsel's presentation of findings to the Department of Justice (DOJ) including restated damage claims for settlement discussions.
- Mr. Boyles sponsored a series of expert witness reports for a U.S. Class I railroad in a proceeding in front of the STB evaluating rail rates into and out of Buffalo, NY after the division of Conrail (*i.e.*, Finance Docket 33388, Buffalo Rate Study).
- He headed a project team of six in a breach of contract litigation between a coal-fired utility and a U.S. Class I railroad. He critically reviewed opposition's expert witness report, identified errors, and restated opposition's position resulting in diminished damage claims. He drafted an expert witness report and supported outside counsel in depositions.

Projects related to the telecommunications industry include the following:

- Mr. Boyles reviewed numerous Regional Bell Operating Companies (RBOCs) cost models and their inputs, as well as associated cost studies of unbundled network elements (UNEs) for clients attempting to enter the local telecommunications market as a result of the Telecommunications Act of 1996. He identified the major cost drivers of these models and identified where these models and/or their inputs deviated from the economic guidelines established by Federal Communications Commission (FCC), referred to as Total Element Long Run Incremental Costs (TELRIC). He reran the models producing restated cost studies, which were submitted to state Public Utility Commissions (PUCs) in order to establish interconnection rates. Mr. Boyles sponsored expert written testimony and testified in hearings before PUCs. He also supported the client's business units to identify cost-based rates for use in interconnection agreement negotiations and supported counsel in depositions and hearings preparation.
- Mr. Boyles reviewed the telecommunications cost model sponsored by the FCC for any inconsistencies between the model's stated intention and its actual application. He proposed and implemented dramatic improvements to the model's feeder and distribution structure sharing and quantified its impacts. He presented his results to FCC staff who admitted they would have included those improvements, but they were unable to figure out how to implement them.
- He coordinated production of a six-volume report on the direction and competitive environment of Internet broadband access. The report evaluated market share forecasts of DSL, cable modem, wireless and satellite technologies. It included competitor analysis supported by extensive Internet research. He also researched potential for unfair competitive advantage in providing broadband content, including evaluating portal companies and content providers.

Prior to joining FTI Consulting, Mr. Boyles was a consultant with ALK Associates.

- Mr. Boyles evaluated the divestiture of rail lines for a major North American railroad. He quantified the traffic losses to the divesting railroad and the traffic gains to the acquiring railroad, which he presented to marketing and strategic planning personnel from both railroads.
- He evaluated and quantified the incremental rail traffic that the combination of two U.S. Class I railroads could capture from other railroads as part of the merger application before the Interstate Commerce Commission (ICC). He provided traffic data preparation and support for other consultants in their studies for the merger application.

- He jointly managed a multi-firm project to develop an integrated computer-based costing algorithm and railroad network model applying a Simplified Stand-Alone Cost (SSAC) standard for transportation services by railroad. He presented the model methodology before the ICC as part of a proceeding to determine an economical procedure for handling small shipper claims of unreasonable rail rates. He worked with prominent economists to ensure the model correctly applied the underlying economic theory.
- Mr. Boyles designed and implemented a computer system to optimally reposition empty intermodal containers within North America for the daily operations of a worldwide steamship line. He worked closely with the client's IT staff to develop the user interface.

APPENDIX B

CURRICULUM VITAE OF DIVYA MATHUR, PH.D.

DIVYA MATHUR, PH.D.

Managing Principal, Analysis Group, Inc.

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Dr. Mathur specializes in the application of microeconomics, statistics, and econometrics to complex litigation matters, government and regulatory investigations, and consulting engagements in the areas of antitrust and competition and complex commercial disputes. She has provided expert economic testimony on antitrust, class certification, and damages issues at depositions and trials in federal court and has been qualified by courts as an expert economist. Her economic and financial expertise includes the analysis of market structure and competitive dynamics; economic and financial modeling in merger review and regulatory proceedings; assessment of competitive effects pertaining to mergers and antitrust conduct such as price-fixing, information sharing monopolization, and alleged exclusionary practices; modeling of damages and lost profits; valuation of businesses and assets; and evaluation of financial performance and pricing strategies in regulated industries such as transportation, telecommunications, pharmaceuticals, and financial services. Her engagements have included work on behalf of the United States Department of Justice and the Federal Trade Commission, as well as companies in numerous industries including transportation, technology, telecommunications, manufacturing, and financial services. Dr. Mathur has also submitted expert statements before the Surface Transportation Board in connection with compensation for trackage rights and has conducted economic analysis in other regulatory contexts involving the Federal Communications Commission and the International Trade Commission. Dr. Mathur has published and presented extensively on topics including merger analysis, antitrust issues, and the intersection of economics and financial analysis in regulatory enforcement. She has lectured on competitive strategy and microeconomics at The University of Chicago and has served as a guest lecturer on topics in competitive strategy and industrial structure at the Kellogg School of Management at Northwestern University.

PROFESSIONAL EXPERIENCE

2008–Present, Analysis Group, Inc.

EDUCATION

Ph.D. Economics, The University of Chicago

Areas of Specialization: Industrial Organization, Labor Economics

M.A. Economics, The University of Chicago

A.B. Economics and Mathematics, *summa cum laude*, Mount Holyoke College

EXPERT WITNESS ENGAGEMENTS

- ***The City of Philadelphia v. Bank of America Corporation et al.***
United States District Court, Southern District of New York
Submitted expert report on antitrust merits issues in an alleged price-fixing and information-sharing conspiracy involving VRDOs on behalf of defendant banks (2026)
- ***Regeneron Pharmaceuticals, Inc. v. Amgen Inc.***
United States District Court, District of Delaware
Testified at trial and deposition on antitrust damages pertaining to allegations of exclusionary conduct in pharmaceutical drugs pricing on behalf of Regeneron (2025)
- ***G.I. Industries dba Waste Management v. Arakelian Enterprises dba Athens Services***
Superior Court of the State of California, County of Ventura
Testified at deposition on antitrust issues pertaining to allegations of below-cost pricing on behalf of Athens (2025)
- ***In re: LIBOR-Based Financial Instruments Antitrust Litigation***
United States District Court, Southern District of New York
Testified at deposition on antitrust merits issues in an alleged price-fixing conspiracy on behalf of Credit Suisse (2024)
- ***Atchison, Topeka & Santa Fe Railway Company – Operating Rights – Southern Pacific Transportation Co.***
Surface Transportation Board
Submitted expert statements on compensation for trackage rights on behalf of Union Pacific Railroad Company (2024)
- ***Carlisle Construction Materials, LLC, et al. v. Graco Inc., et al.***
United States District Court, District of Delaware
Testified at trial and deposition on antitrust issues and damages in the spray foam insulation industry on behalf of Carlisle (2024)
- ***Misty Snow, et al. v. Align Technology***
United States District Court, Northern District of California
Testified at deposition on class certification and damages pertaining to antitrust claims on behalf of Align (2024)
- ***In re: EpiPen Direct Purchaser Litigation***
United States District Court, District of Minnesota
Testified at deposition on class certification on behalf of CVS Caremark, Express Scripts, and OptumRx pertaining to rebating practices (2023)

- ***Erica Frasco, et al. v. Flo Health, Inc., Google, LLC, Meta Platforms, Inc., and Flurry, LLC***
United States District Court, Northern District of California
Testified at deposition on class certification on behalf of Google on privacy and data collection practices on a mobile app (2023)
- ***Brainchild Surgical Devices, et al. v. CPA Global Limited***
United States District Court, Eastern District of Virginia
Testified at deposition on class certification and damages on behalf of Defendant regarding disclosure of fees (2023)
- ***In re: Foreign Exchange Benchmark Rates Antitrust Litigation***
United States District Court, Southern District of New York
Testified at trial and deposition on antitrust issues in an alleged price-fixing conspiracy on behalf of Credit Suisse (2022)
- ***Global Tubing, LLC v. Tenaris Coiled Tubes, LLC***
United States District Court, Southern District of Texas
Testified at deposition on antitrust merits and damages pertaining to monopolization allegations in the oil and gas industry on behalf of Tenaris (2022)
- ***Marriott International Customer Data Security Breach Litigation***
United States District Court, District of Maryland
Testified at deposition on damages related to a data security incident on behalf of Marriott (2021)
- ***Ingevity Corporation, et al. v. BASF Corporation***
United States District Court, District of Delaware
Testified at trial and deposition on antitrust merits and damages from alleged exclusive dealing and tying arrangements in the automotive parts industry on behalf of BASF (2020–2021)
- ***Tillage, et al. v. Comcast Corporation, et al.***
United States District Court, Northern District of California
Testified at deposition on class certification and damages from alleged false advertising in the cable television industry on behalf of Comcast (2021)
- ***Payment Logistics Limited v. Lighthouse Network, LLC, et al.***
United States District Court, Southern District of California
Submitted expert report on the economic impact of a vertical merger on competition in the payment card processing industry on behalf of Lighthouse Network (2019)

SELECTED CONSULTING ENGAGEMENTS

Antitrust, Competition, and Regulation

- Analysis of competition and regulatory issues on behalf of an online e-commerce marketplace
- Analysis of competition issues related to a mobile app store on behalf of a major technology firm

- Analysis of competition issues related to a proposed merger in the book publishing industry
- Analysis of competition issues pertaining to an early-stage acquisition in the pharmaceutical industry
- Analysis of antitrust liability and damages pertaining to the ticket sale practices of a major league sports team
- Analysis of competition issues related to a proposed merger in the telecommunications industry on behalf of the DOJ
- Analysis of competition issues related to a proposed merger in the sewage and waste management industry
- Analysis of the impact of alleged price fixing and bid rigging on behalf of a major automotive parts manufacturer
- Analysis of economic issues related to interchange rates and network rules and fees in the credit card industry
- Analysis of antitrust liability and damages related to allegations of price-fixing in the issuance of government-sponsored enterprise (GSE) bonds on behalf of a major financial institution
- Assessment of the economic impact of an import ban on certain smartphones and tablets on behalf of a major mobile device manufacturer in a US International Trade Commission (ITC) proceeding
- Assessment of the economic impact of an import ban on certain microprocessors, servers, and personal computers on behalf of a major microprocessor manufacturer and original equipment manufacturers in an ITC proceeding
- Assessment of competition in the marketplace for business data services including enterprise-level broadband internet services on behalf of a service provider in a US Federal Communications Commission proceeding
- Analysis of competition issues related to steering and tiering contractual provisions between health care providers and payers in a major health care system on behalf of the DOJ
- Analysis of antitrust liability and damages from refusal to deal and tying claims in the sale of demand deposit account debt portfolios
- Analysis of antitrust liability and damages from monopolization and tying claims involving applications on e-book viewers
- Analysis of antitrust liability and damages issues related to a consummated merger pertaining to drugs prescribed for pediatric heart defects on behalf of the FTC

Class Certification

- Assessment of class certification and damages claims by direct purchasers and end-payors of a brand name immunosuppressant drug
- Assessment of class certification and damages claims by direct purchasers and end-payors of a brand-name beta-blocker drug
- Assessment of class certification and damages claims by direct purchasers of a pharmaceutical therapy for Alzheimer's disease

- Assessment of class certification claims related to payment cards involved in an electronic data security breach
- Analysis of class certification claims related to alleged Real Estate Settlement Procedures Act (RESPA) violations associated with mortgage reinsurance
- Design and analysis of a survey on washing machines in connection with class action damages analyses

Intellectual Property

- Assessment of damages from alleged breach of contract and trademark misuse in the medical device industry
- Assessment of damages from the alleged infringement of a design patent in a retail merchandising and store display system
- Assessment of damages arising from the misappropriation of trade secrets related to product classification and data management systems.
- Analysis of appropriate licensing fees for performing rights for musical compositions in a major performing right organization's repertory
- Analysis of the economic value of patents donated to academic institutions using bibliometric and citation analyses using US Patent and Trademark Office (USPTO) patent data
- Analysis of economic issues related to the scanning and digitizing of books undertaken by a major technology company

Complex Commercial Litigation

- Estimation of damages and valuation of assets in a breach of contract dispute in the chemicals industry
- Valuation of insurance claims and related statistical analyses arising from wildfires
- Estimation of damages pertaining to a manufacturing and supply agreement in the pharmaceutical industry on behalf of a drug manufacturer
- Estimation of damages pertaining to pricing and rebates of pharmaceuticals in a breach of contract dispute on behalf of a major drug wholesaler
- Analysis of liability and damages from allegations of misrepresentation and defamation in the information technology research industry
- Assessment of damages from alleged false advertising and Lanham Act claims in the ride-sharing industry
- Statistical analysis of traffic stops on behalf of a major city police department
- Analysis of statistical sampling issues related to the purchase and securitization of residential mortgage loans
- Estimation of damages in a breach of contract dispute in the sub-prime credit card industry, including claims relating to contractual changes in credit card accounts and credit debt waiver products.
- Estimation of damages arising from an alleged breach of contract to provide logistics and distribution services for the US Army in overseas military engagements

- Estimation of damages resulting from an alleged breach of a market development agreement in the activated carbon industry
- Estimation of economic damages arising from a contract dispute related to military equipment

SELECTED PRESENTATIONS

- “Recent Developments in Cartels,” Global Antitrust/Competition Law Conference, Center for Transnational Law and Business, USC Gould School of Law, May 2023
- Spring Meeting Mock Trial, American Bar Association Antitrust Law Section Spring Meeting, April 2023
- “The Ongoing Tale of Two-Sided Markets,” American Bar Association Antitrust Law Section Spring Meeting, April 2022
- “Mobile Payments in the Antitrust Spotlight,” Antitrust Law, Internet & Cybersecurity Law, and Media and Communications Sections, American Bar Association, April 2021
- “Antitrust, IP, and Privacy | Intersections in Trends, Policies, and Strategies,” UIC John Marshall Law School Center for Intellectual Property, Information & Privacy Law, March 2021
- “Predicting the Future: U.S. M&A Consideration of Future Competitiveness of Merging Parties,” New York State Bar Association, Antitrust Section Mergers Committee, July 2020
- “Digital Platforms: Innovation, Antitrust, and Privacy,” UIC John Marshall Law School Center for Intellectual Property, Information & Privacy Law, March 2020
- “Tech in the Global Enforcement Spotlight,” Antitrust, Internet and Media Sections, American Bar Association, March 2020
- “Next Generation of Antitrust, Data Privacy and Data Protection Scholars,” NYU School of Law, American Bar Association, January 2020
- “Who Owns My Data,” Antitrust and Consumer Protection Sections, American Bar Association, November 2019
- “Pill Power: The Economics of Monopolization Claims in Pharmaceutical Markets,” Law and Economics Symposium: Current Topics in Life Sciences, May 2019
- “Introduction to Regression Analysis in Antitrust Litigation,” American Bar Association, November 2017
- “Competitive Strategy and Industrial Structure,” Kellogg School of Management at Northwestern University, 2016 and 2017
- “Competitive Strategy,” Kellogg School of Management at Northwestern University, 2016

SELECTED PUBLICATIONS

- “The Ongoing Tale of Two-Sided Markets,” with Ankur Kapoor, *Antitrust*, Volume 36, Number 3, Summer 2022
- “The Challenges of Using Return on Capital as an Indicator of Monopoly Power,” with Jakab Laszlo, Lau Christensen, and Aaron Yeater, *6th National Conference on Economics of Competition Law*, Competition Commission of India, March 2021

- “Remember Stacker? Another Look at Killer Acquisitions in the Digital Economy,” with Benoit D’Udekem and Marc Van Audenrode, *CPI Antitrust Chronicle*, May 2020
- “The Economic Impact of Open Source Software: How Open Source Platforms Drive Competition and Innovation in India,” with Anindya Ghose and Lau Christensen, *5th National Conference on Economics of Competition Law*, Competition Commission of India, March 2020
- “Economic and Financial Concepts,” with Jeff Cohen and David Smith, chapter in *Proving Antitrust Damages: Legal and Economic Issues*, Third Edition, American Bar Association, 2017

PROFESSIONAL MEMBERSHIPS

- American Economic Association
- American Bar Association (Antitrust Section)
 - ABA Antitrust Section Joint Conduct Committee, Vice Chair (2021–2025)