PUBLIC VERSION

BEFORE THE
SURFACE TRANSPORTATION BOARD

TOTAL PETROCHEMICALS & REFINING USA, INC. Complainant, v. CSX TRANSPORTATION, INC. Defendant.	)	Docket No. NOR 42121

REPLY EVIDENCE OF CSX TRANSPORTATION, INC.

NARRATIVE SECTIONS III-E THROUGH IV

(Volume 2 of 3)

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SHORT FORMS FOR FREQUENTLY CITED CASES

The following short form case citations are used herein:

AEPCO 2001	*Arizona Electric Power Cooperative, Inc. v. Burlington Northern & Santa Fe Railroad Co. & Union Pacific Railroad Co.*, STB Docket No. 42058 (served Dec. 31, 2001)
AEPCO 2002	*Arizona Electric Power Cooperative, Inc. v. Burlington Northern & Santa Fe Railroad Co. & Union Pacific Railroad Co.*, 6 S.T.B. 322 (2002).
AEPCO 2005	*Arizona Electric Power Cooperative, Inc. v. Burlington Northern & Santa Fe Railroad Co. & Union Pacific Railroad Co.*, STB Docket No. 42058, (served Mar. 15, 2005)
AEPCO 2011	*Arizona Electric Power Cooperative, Inc. v. Burlington Northern & Santa Fe Railroad Co. & Union Pacific Railroad Co.*, STB Docket No. 42113, (served Nov. 16, 2011)
AEP Texas I	*AEP Texas North Co. v. BNSF Railway, Co.,* STB Docket No. 41191, (Sub-No. 1) (served Nov. 8, 2006)
AEP Texas II	*AEP Texas North Co. v. BNSF Railway Co.*, STB Docket No. 41191, (Sub-No. 1) (served Sept. 10, 2007)
CP&L	*Carolina Power & Light Co. v. Norfolk Southern Railway Co.*, 7 S.T.B. 235 (2003)
Duke/CSXT	*Duke Energy Corp. v. CSX Transportation, Inc.*, 7 S.T.B. 402 (2004)
Duke/NS	*Duke Energy Corp. v. Norfolk Southern Railway Co.*, 7 S.T.B. 89 (2003)
Duke/NS Reconsideration	*Duke Energy Corp. v. Norfolk Southern Railway Co.*, 7 S.T.B. 862 (2004)
DuPont	*E.I. DuPont de Nemours & Co. v. Norfolk Southern Railway Co.*, STB Docket No. 42125 (served Mar. 24, 2014)
FMC	*FMC Wyoming Corp. v. Union Pacific Railroad Co.*, 4 S.T.B. 699 (2000)
IPA	*Intermountain Power Agency v. Union Pac. R.R. Co.*, STB Docket No. 42127 (served April 2, 2012).

M&G	*M&G Polymers USA, LLC v. CSX Transportation, Inc.*, STB Docket No. 42123 (served Sept. 27, 2012)
Major Issues	*Major Issues in Rail Rate Cases*, STB Ex Parte No. 657 (Sub-No. 1) (served Oct. 30, 2006), *aff'd sub nom. BNSF v. STB*, 526 F.3d 770 (D.C. Cir. 2008)
McCarty Farms	*McCarty Farms, Inc. v. Burlington Northern, Inc.*, 2 S.T.B. 460 (1997)
Otter Tail	*Otter Tail Power Co. v. BNSF Railway Co.*, STB Docket No. 42071 (served Jan. 27, 2006)
PPL Montana	*PPL Montana v. BNSF Railway Co.,* 6 S.T.B. 286 (2002)
Rate Regulation Reforms	*Rate Regulation Reforms*, STB Ex Parte No. 715 (served July 25, 2012)
SAC Procedures	*General Procedures for Presenting Evidence in Stand-Alone Cost Rate Cases*, 5 S.T.B. 441 (2001)
SunBelt	*SunBelt Chlor Alkali Partnership v. Norfolk Southern Railway Co.*, STB Docket No. 42130 (served June 20, 2014)
TMPA I	*Texas Municipal Power Agency v. Burlington Northern & Santa Fe Railway Co.*, 6 S.T.B. 573 (2003)
TMPA II	*Texas Municipal Power Agency v. Burlington Northern & Santa Fe Railway Co.*, 7 S.T.B. 803 (2004)
TPI Market Dominance	*Total Petrochemicals & Refining USA, Inc. v. CSX Transportation, Inc.*, STB Docket No. 42121 (served May 31, 2013)
West Texas	*West Texas Util. Co. v. Burlington Northern Railroad Co.*, 1 S.T.B. 638 (1996).
WFA I	*Western Fuels Ass'n & Basin Elec. Power Cooperative v. BNSF Railway Co.*, STB Docket No. 42088 (served Sept. 10, 2007)
WFA II	*Western Fuels Ass'n, Inc. v. BNSF Railway*, STB Docket No. 42088 (served Feb. 17, 2009)
WP&L	*Wisconsin Power & Light v. Union Pac. R.R. Co.*, 5 S.T.B. 955 (2001)
Xcel	*Public Service Co. of Colorado d/b/a Xcel Energy v. Burlington Northern & Santa Fe Railway Co.*, 7 S.T.B. 589 (2004)

ACRONYMS

AAR	Association of American Railroads
ABC	Algorithmic Blocking and Classification
AC	Alternating Current
ACSES	Advanced Civil Speed Enforcement System
ADA	Americans with Disabilities Act
ADE	Assistant Division Engineer
AEI	Automatic Equipment Identification
AEO	Annual Energy Outlook
AFE	Authorizations for Expenditure
AGS	Automatic Gate Systems
APA	Administrative Procedure Act
APU	Auxiliary Power Unit
AREMA	American Railway Engineering and Maintenance-of-Way Association
ARIL	Arrival at Intransit Location
ARRA	American Recovery and Reinvestment Act
ATC	Average Total Cost
AVP	Assistant Vice President
B&B	Bridge & Building
BCFD	Billion Cubic Feet per Day
BCY	Bank Cubic Yard
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe Railway Company
BRC	Belt Railway of Chicago
C&S	Communications and Signals

CAGR	Compound Annual Growth Rate
CAPP	Central Appalachian
CBG	Coal Business Group
CDL	Commercial Driver's License
CE&I	Construction, Engineering, and Inspection
CFS	Commodity Flow Survey
CMA	Chemical Manufacturers Association
CMP	Aluminized Corrugated Metal Pipe
CN	Canadian National Railway Company
CNW	Chicago & North Western Railway Company
CP	Canadian Pacific Railway
CRE	Counselors of Real Estate
CSAPR	Cross-State Air Pollution Rule
CSXT	CSX Transportation, Inc.
CTC	Centralized Traffic Control
CWA	Clean Water Act
CWR	Continuous Welded Rail
CY	Cubic Yards
DCF	Discounted Cash Flow
DFLC	Departed From Location
DME	Dimethyl Ether
DMF	Dimethyl Formamide
DMI	Digital Mapping Index
DOT	Department of Transportation
DP	Distributed Power

DTL	Direct-to-Locomotive
EAP	Employee Assistance Program
ECY	Embankment Cubic Yard
EDI	Electronic Data Interchange
EEO	Equal Employment Opportunity
EIA	Energy Information Administration
EJ&E	Elgin Joliet & Eastern Railway
EMT	Elizabeth Marine Terminal
ENS	Emergency Notification Signs
EOS	End of Siding
EPA	Environmental Protection Agency
ERAS	Event Recorder Automated Download
ERP	Enterprise Resource Planning
ETMS	Electronic Train Management System
EVA	Energy Ventures Analysis, Inc.
FAS	Financial Accounting Standards
FASB	Federal Accounting Standards Board
FCC	Federal Communications Commission
FED	Failed Equipment Detector
FELA	Federal Employers Liability Act
FHWA	Federal Highway Administration
FMLA	Family and Medical Leave Act
FRA	Federal Railroad Administration
FRICS	Fellow of the Royal Institute of Chartered Surveyors
FSC	Fuel Surcharges

G&A	General & Administrative
GAO	Government Accountability Office
GDP	Gross Domestic Product
GE	General Electric
GIS	Geographic Information System
GPS	Global Positioning System
GVW	Gross Vehicle Weight
G&W	Genesee and Wyoming Railroad
HM-1	United States Hazardous Materials Instructions for Rail
HSL	Hours of Service Law (49 U.S.C. Ch. 211)
HTUA	High Threat Urban Area
HVAC	Heating, Ventilation, and Air Conditioning
HYSS	Hump Yard Simulation System
ICBS	Interoperable Communications-Based Train Control System
ICC	Interstate Commerce Commission
ICHD	Interchange Delivery
IHB	Indiana Harbor Belt Railway
ISA	Intercarrier Service Agreement
ISS	Interline Settlement System
ITCS	Integrated Train Control System
ITMS	Integrated Transportation Management System
KCS	Kansas City Southern Railway
LARS	Locomotive Assignment and Routing System
LCY	Loose Cubic Yard
LNW	Louisiana and North West Railroad

LUM	Locomotive Unit Mile
MAI	Member of the Appraiser Institute
MATS	Mercury and Air Toxics Standards
MEE	Manager Electronics Engineering
MGT	Million Gross Ton
MM&A	Montreal, Maine, and Atlantic Railroad
MMBtu	million British Thermal Units
MMM	Maximum Markup Methodology
MOW	Maintenance-of-Way
MRE	Market Research and Economics Group
MRL	Montana Rail Link
MSA	Managed Services Agreement
MSE	Mississippi Export Railroad
MSP	Modified Straight-Mileage Prorate
N&W	Norfolk and Western
NAPP	Northern Appalachian
NARS	Non-accident Releases
NERC	North American Electric Reliability Corporation
NMC	Natural Moisture Content
NPRM	Notice of Proposed Rule Making
NRCS	Natural Resource Conservation Service
NROI	Net Railway Operating Income
NS	Norfolk Southern Railway Company
NTF	No Trouble Found
NYMEX	New York Mercantile Exchange

O/D	Origin/Destination
OMC	Optimum Moisture Content
OSHA	Occupational Safety and Health Administration
PACT	Placed at Customer Facility
PFPS	Pulled from Patron Siding
PHMSA	Pipeline and Hazardous Safety Administration
PIH	Poisonous-by-Inhalation
PRB	Powder River Basin
PTC	Positive Train Control
P&W	Providence and Worcester Railroad
R/VC	Revenue to Variable Cost
RBMN	Reading Blue Mountain and Northern Railroad Company
RCAF	Rail Coal Adjustment Factor
RCP	Reinforced Concrete Pipe
RCRA	Resource Conservation and Recovery Act
REM	Roadway Equipment Mechanics
RIP	Repair In Place
ROW	Right-of-Way
RPMS	Real Property Management System
RSAM	Revenue Shortfall Allocation Method
RSC	Rail Security Coordinator
RSIA	Rail Safety Improvement Act of 2008
RTA	Railroad Tie Association
RTC	Rail Traffic Controller
RTG	Rubber-Tired Gantry

SAC	Stand-Alone Cost
SARR	Stand-Alone Railroad
SBRR	SunBelt Railroad
SCAN	Soil Climate Analyst Network
SCTG	Standard Classification of Transportation Goods
SECI	Seminole Electric Cooperative, Inc.
SFAS	Statement of Financial Accounting Standards
SFC	Specific Fuel Consumption
S&I	Inspection Shops
SIP	State Implementation Plans
SJRRC	San Joaquin Regional Rail Commission
SOX	Sarbanes-Oxley Act
SP	Southern Pacific Railroad
SPLC	Standard Point Location Code
SSA	Shared Asset Area
SSI	Sensitive Security Information
STB	Surface Transportation Board
STCC	Standard Transportation Commodity Code
SWPPP	Stormwater Pollution Prevention Plan
SYC	Static Yard Capacity
T&E	Train & Engine
TBT	Thoroughbred Bulk Terminal
TCS	Triple Crown Services
TDIS	Thoroughbred Direct Intermodal Services
TI	Traffic Index

TIH	Toxic-by-Inhalation
TKMV	Track Move/Inventory Move
TMS	Transportation Management Services
TRANSCAER	Transportation Community Awareness and Emergency Response
TRASD	Terminal Railway Alabama State Docks
TRRA	Terminal Railroad Association of St. Louis
TSA	Transportation Security Administration
TYES	Thoroughbred Yard Enterprise System
UPS	United Parcel Service
URCS	Uniform Rail Costing System
USDOT	U.S. Department of Transportation
USPAP	Uniform Standards of Professional Appraisal Practice
W&LE	Wheeling and Lake Erie Railway
WQMP	Water Quality Management Plan
WSS	Web Soil Survey
WTI	West Texas Intermediate

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III. STAND-ALONE COST

E. Non-Road Property Investment

Non-road property investment costs, including costs for locomotives, railcars, and intermodal equipment are addressed in Section III-D along with the discussion of the operating costs for those items.

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III. STAND-ALONE COST

F. Road Property Investment

CSXT's Reply Evidence demonstrates that TPI underestimated the road property investment costs of the TPIRR by more than $12 billion, as summarized in Table III-F-1. In this Section III-F, CSXT explains the significant differences between TPI's road property investment evidence and the superior evidence CSXT provides in this Reply.

Table III-F-1
TPIRR Road Property Investment
($ in Millions)

	Item	TPI Amount	CSXT Amount
	(1)	(2)	(3)
1.	Land - 1/	$3,956	$5,412
2.	Roadbed Preparation	3,746	$6,139
3.	Track Construction	8,494	$10,990
4.	Tunnels	1,596	$1,630
5.	Bridges	3,438	$5,271
6.	Signals and Communications	1,554	$2,661
7.	Buildings and Facilities	985	$1,492
8.	Public Improvements	226	$463
9.	Subtotal	$23,996	$34,059
10.	Mobilization	541	881
11.	Engineering	2,004	2,865
12.	Contingencies	2,258	3,239
13.	Total	$28,799	$41,044

Source: CSXT Reply WP "III-F Total CSXT Reply.xlsx"
1/ - Land value includes $3,540,667,939 as of 2008. The remainder is valued as of 2010.

1. Land[1]

TPI estimates that the TPIRR could acquire all of its necessary land—including land for the right-of-way for 6,866 TPIRR-owned route miles and land for yards and microwave towers— totaling 89,040 acres for $3.96 billion at 2010 real estate price levels. TPI indexes this total back to the 2008 assumed acquisition date, and thus its 2008 real estate cost for the TPIRR reflected in the DCF is $5.25 billion.[2] CSXT generally accepts TPI's valuation approach and results, with four exceptions where TPI's methodology is plainly flawed or in conflict with clear Board precedent.

First, TPI's desktop methodology produced inaccurate results in urban areas. In particular, by failing to conduct a detailed on-the-ground appraisal, TPI made classification errors that resulted in high-value land in urban areas such as Chicago and Baltimore being classified as essentially worthless "restricted" land. TPI's desktop appraisal also resulted in errors in identifying valuation units in these urban areas. Land use changes rapidly in urban areas, as a result for these areas in particular, a desktop appraisal is inappropriate. CSXT will illustrate how TPI's appraisal resulted in errors that produced artificially low valuations for urban areas.

Second, CSXT valued easements at the cost at which TPI would have to pay to acquire them in 2008. This methodology follows well-established Board precedent. *See SunBelt*, STB Docket No. 42130, at 103; *DuPont*, STB Docket No. 42125, at 139.

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[1] This Land Valuation Section is sponsored by Michael P. Hedden and John Ennis, who are real estate experts. Mr. Hedden and Mr. Ennis have reviewed the TPI land valuation evidence and prepared an alternative retroactive appraisal valuation report for certain segments of the TPIRR. Both Mr. Hedden's and Mr. Ennis' credentials and expertise are described in more detail in Section IV *infra*.

[2] *See* TPI Opening WP "Exhibit III-H-1.xls," Tab "Investment," Column N.

Third, CSXT has included in its real estate valuation the cost of acquiring those lands necessary to construct the partially owned lines used by the TPIRR. *See supra* III-B-1-c.

Fourth, because TPI consistently undersized its yards and communication facilities, and failed to construct five yards, 17 interchange yards, two partially owned yards, three intermodal facilities, and a coal pier required to serve its customer base, CSXT has valued the additional land that the TPIRR would require to build those necessary facilities.

CSXT has also included a cost for real estate acquisition, which the TPIRR would incur in order to acquire over 80,000 acres of land necessary for its ROW, yards, and other facilities. CSXT's experts have developed a reasonable estimate of the additional costs associated with the acquisition of land for the TPIRR, and this Reply evidence adjusts TPIRR road property investment costs accordingly.

Under TPI's proposed construction schedule, which CSXT accepts, the TPIRR will acquire all of its real estate between May and November of 2008.[3] Although TPI's appraisers[4] value the TPIRR real estate in 2010—after the decline in real estate values that coincided with the recession that began in late 2008—unlike some past complainants TPI applies a land value index to the 2010 land values that captures in some measure the decline in real estate values occurring between the assumed acquisition date and the valuation date. While it would have been better practice to value property as of the acquisition date in 2008 rather than valuing it in 2010 and indexing it back to 2008, CSXT accepts TPI's valuation for most of the TPIRR's right of way. However, TPI has significantly undervalued certain urban areas, as demonstrated below.

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[3] *See* TPI Opening WP "Exhibit III-H-1.xlsx" tab "IDC", Column BP.

[4] TPI's real estate evidence was sponsored by Richard R. Harps and several other witnesses who appear to have been working under Mr. Harps' direction. *See* TPI Opening III-F-1-2. Because in some cases it is not clear whether work was performed by Mr. Harps or by one of TPI's other witnesses, the terms "TPI appraiser" and "TPI appraisal team" are used herein to refer collectively to TPI's real estate witnesses.

In comparison, CSXT's appraisal results in a real estate cost for those urban areas of $2,915,477,000.

a. TPI's Reliance Upon a Desktop Appraisal Results in Inaccurate Valuations in Urban Areas.

TPI's appraisers relied upon a desktop appraisal methodology that utilized aerial imagery from Google Earth Pro to trace the path of the TPIRR and identify land uses adjacent to the right-of-way, which formed the basis for the assigned values.[5] CSXT accepts TPI's approach for determining land usage for rural areas, but rejects TPI's approach for the TPIRR's high density urban areas of Chicago, IL; Washington, DC; Atlanta, GA; Pittsburgh, PA; Nashville, TN; Jacksonville, FL; and Chattanooga, TN. High density urban areas are characterized by frequent changes in land usage, and in many instances these changes are not apparent from available aerial photos. Accurate classifications for high density urban areas require on-the-ground evaluations. For this reason, CSXT's appraisers developed valuations of these high-density urban areas based on physical inspections of the TPIRR right-of-way. Details of CSXT's appraisal are set forth in Exhibit III-F-1.

Actual, thorough, on-the-ground physical inspections are the Board's preferred method for classifying Highest and Best Use. *See, e.g., FMC*, 4 S.T.B. at 797 (approving of UP's physical inspection approach to valuation). Such direct actual inspections are particularly important for accurate classification of land in metropolitan areas where land use changes rapidly and value is typically highest. Additionally, on-the-ground appraisals permit the identification of more discrete valuation units, which is particularly important in urban areas where land parcels tend to be small. In these areas, CSXT's appraisers' more extensive, thorough, and detailed

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[5] TPI Opening III-F-4.

physical inspections produced more accurate land classifications than those of TPI, which directly impacted valuation.

i. CSXT's On-the-Ground Inspections Identified Errors in TPI's Land Classifications in Major Metropolitan Areas.

CSXT conducted physical inspections of the TPIRR routes through Atlanta, Chicago, Baltimore, Chattanooga, Jacksonville, Nashville, Pittsburgh, and Washington, DC. CSXT's inspections in Atlanta, Chicago, and Baltimore took place over 11 days between March and June, 2014.[6] Its inspections in Chicago and Baltimore extended beyond the boundaries of TPI's appraised route. In Chicago, CSXT inspected the right-of-way along portions of the Indiana Harbor Belt Railway ("IHB") currently owned by CSXT. In Baltimore, the inspections included portions of the track segment to the Curtis Bay coal transfer facility, to which the TPIRR route is extended as part of CSXT's reply operating plan.[7]

CSXT's detailed physical inspection of urban areas along the SARR ROW resulted in different, and in many instances, higher value usages than those identified by TPI's appraisers based on their desktop review. For example, in Cook County, IL, near Chicago, TPI applied a land usage factor of restricted—meaning land of little to no value—to a 1.3 mile segment of the right-of-way, that is adjacent to an existing golf course. Golf courses appear as dark, undeveloped parcels in aerial photos and can be easily mistaken for some other type of land.

[6] CSXT's appraisal also relies upon physical property inspections conducted by Arnold Tesh between September 21 and December 13, 2009 for the following cities: Chattanooga, Jacksonville, Nashville, Pittsburgh, and Washington, DC. These detailed physical inspections were conducted by Mr. Tesh on behalf of CSXT in preparation of CSXT's defense of the rate reasonableness challenge brought by Seminole Electric Cooperative, Inc. (STB Docket No. 42110). Mr. Tesh passed away in March 2012. Mr. Hedden and Mr. Ennis reviewed Mr. Tesh's land use classifications and accepted those as the basis for identifying classifications in those urban areas. Because Mr. Tesh's sales data was outdated, CSXT's appraisers used more recent sales data to determine an average value per unit for each land use classification. *See* CSXT Reply Ex. III-F-1 at 15-16.

[7] *See* CSXT Reply III-B-19.

CSXT assigned usages of residential and commercial to this segment based on its on the ground observations. TPI assigned a value to that 1.3 mile segment of $2,166,455. Comparatively, CSXT's on-the-ground appraisal method resulted in a land usage classification that produced a valuation of $8,383,950.

In Atlanta, TPI assigned a usage of restricted to a 0.56 mile segment of TPIRR right-of-way that abuts a house and farm. Based on its observations of development in the vicinity of the right of way, CSXT determined the highest and best use classification of that land to be industrial. CSXT's classification resulted in a valuation of $5,389,040—487% higher than TPI's $1,106,424 assigned value. In Anne Arundel County outside of Baltimore, TPI assigned a restricted usage to a 0.91 mile segment of right-of-way abutting the Laurel Racetrack. This property is clearly developable and has been classified by CSXT as both industrial and commercial. TPI's erroneous classification resulted in a valuation of $830,030—much lower than CSXT's $5,129,930 valuation using more accurate land use classifications. These and other examples of mis-classifications by TPI are detailed in Exhibit III-F-2.

ii. TPI's Desktop Appraisal Produced Inaccurate Valuation Units along the TPIRR ROW.

In rural areas, valuation units tend to be large and fairly easy to identify. Comparatively, valuation units in urban areas are small and are not easily identifiable by any means other than an on-the-ground inspection. As a result, CSXT's detailed physical inspections identified more discrete valuation units along the TPIRR right-of-way than identified by TPI's appraisers. For example, along a 5.5 mile segment of the ROW in the Nashville Metro Area, CSXT's appraisers identified 22 valuation units where TPI's appraisers' identified only 11. CSXT Reply Ex. III-F-3 at A-NAS-07. CSXT's detailed approach identified more discrete changes in value, which is to be expected in urban areas. Similarly, along a 3.6 mile segment of the ROW in Burnham, IL, in the suburbs of Chicago, CSXT identified 24 discrete valuation units. Comparatively, TPI's desktop appraisal produced an analysis of only 9 valuation units. *Id.* at A-CHI-02.[8] Failure to identify these discrete valuation units contributed to TPI's unreliable appraisal. CSXT Exhibit III-F-3 identifies other areas in which TPI's desktop appraisal resulted in significantly fewer unique valuation units than CSXT's on-the-ground approach. This comparison demonstrates that the CSXT Appraisers' more detailed analysis consistently identified a higher number of valuation units in segments along the ROW, which led to a more thorough and accurate appraisal.

The CSXT Appraisers have determined that the 2008 market value for real estate in urban these areas total $2,915,477,000. As discussed previously, TPI conducted its TPIRR land valuation as of mid-2010 and indexed the results in its DCF back to assumed time of TPIRR land acquisition in mid-2008. To avoid the potential distortions to land values of developing prices from sales that occurred after the assumed acquisition date and indexing values back for two years, CSXT developed appraised values for the identified major metropolitan areas as of the assumed acquisition date in mid-2008. Table III-F-2 compares TPI's 2010 values and its 2010 values indexed to mid-2008 levels to the values developed by CSXT for the TPIRR major metropolitan areas.

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[8] This segment also illustrates TPI's failure to properly classify land, as discussed above. Of the 33 acres along this segment appraised by TPI, 15.9 of those acres were classified as "restricted." In comparison CSXT identified only 0.8 of those acres as restricted land, and 2.4 acres of commercial land, a classification that TPI did not identify at all along this segment. *Id.* CSXT's in-person review also identified many more acres of residential and industrial property than TPI found.

Table III-F-2
Comparison of CSXT and TPI Derived Values for TPIRR Major Metropolitan Areas

Metropolitan Area	TPI		CSXT 2008		Difference
	2010	Indexed to 2008	Lines Valued by TPI	Lines Not Valued by TPI	2008 Levels
Atlanta	$244.3	$324.3	$403.7	$0.0	$79.3
Chicago	89.7	119	156.0	89.5	126.4
Washington, DC	1,222.7	1,623.1	1,597.0	0.0	-26.0
Baltimore	90.2	119.7	211.1	14.1	105.5
Chattanooga	13.4	17.9	42.0	0.0	24.2
Jacksonville	60.8	80.7	171.7	0.0	91.0
Nashville	49.0	65	214.7	0.0	149.7
Pittsburgh	5.2	6.9	15.7	0.0	8.8
Total	$1,775.3	$2,356.5	$2,811.9	$103.6	$558.9

b. The TPI Appraiser's Valuation of Easements is Contrary to Board Precedent.

TPI inappropriately valued easements along the TPIRR by failing to properly index the value of easements to current market value. Although TPI estimated the fee simple value for the portions of the ROW for which the TPIRR would acquire easements, it removed those costs from its overall land valuation and substituted an estimate of easement costs based on the average original cost of existing easements. TPI Opening III-F-6. TPI's use of actual easement costs, many of which are dated from before 1885—and some as early as 1838—understates tremendously the amount a new entrant today would have to pay.

This method of valuation is contrary to common sense and settled Board precedent. The Board has made it abundantly clear that, like all other investments, easements must be valued at their current market value. *Xcel*, 7 S.T.B. at 669 ("Because all of a SARR's investments should be valued at current costs, BNSF's estimate is used here [for valuing easements]. Xcel's evidence does not reflect the current value of obtaining the necessary easements."). Simply put, because $10 in 1914 had much more purchasing power than $10 does today, the "current value" of an easement bought for $10 in 1914 must account for the effects of inflation over the past century. TPI made no attempt to index the costs of the easement values paid by CSXT to current market prices, and therefore its easement valuation plainly does not "reflect the current value of obtaining the necessary easements." *Id.* More recently, the Board has ruled in *DuPont* and *SunBelt* that this valuation methodology is flawed because "easement values [must] reflect current values of the easements" *Sunbelt,* STB Docket 42130, at 103; *DuPont*, STB Docket No. 42125, at 139 (accepting NS' easement valuation).

CSXT indexed TPI's easement values to reflect current market levels. CSXT developed factors from real estate index values dating back to 1838 and indexed the original easement historical cost to 2008 cost levels. CSXT then calculated each state's average cost per easement acre and applied that value to the total TPIRR easement acreage in the state. The CSXT total value of all easements along the TPIRR right-of-way is $18,443,818.

c. The TPI Appraiser Failed to Value Land in which the TPIRR Has a Partial Ownership Interest.

TPI failed to value land along the TPIRR right-of-way on lines in which CSXT maintains a partial ownership interest. The TPIRR must step into CSXT's shoes and acquire the same ownership interest in the land that CSXT holds. *See AEPCO 2002*, 6 S.T.B. at 328. As such, the TPIRR is responsible for the pro rata share of ownership that the CSXT currently owns along the segments traversed by the TPIRR. *See supra* III-B-1-c. For example, because CSXT owns a 100% interest in the BOCT (IHB), the TPIRR must account for 100% of the land acquisition costs pertaining to the segments of the BOCT (IHB) over which the TPIRR operates. *See supra* III-B-1-c-i-(b). Similarly, CSXT owns a 25% interest in the BRC, which TPI must account for because the TPIRR operates over that line. *See supra* III-B-4. CSXT valued the land using the same methodology used for segments of land for which the TPIRR must acquire full fee simple ownership. That is, CSXT determined ATF Highest and Best Use and applied the average price for comparable sales to conclude a fee simple value. That cost was then apportioned based upon the pro rata share owned by CSXT—and thus the TPIRR. CSXT concluded that the TPIRR's proportionate value of these Partially Owned Lines—a value completely excluded by TPI—is $89.5 million. *See* CSXT Reply WP "CHI MasteFile.xls," Tab "Partial Ownership."

d. Appraisal of Land for Yards and Communications Facilities

In addition to valuing the TPIRR ROW, CSXT accounts for the land required for yards, support facilities, and communications facilities. As explained in Sections III-B and III-C, the yards facilities posited by TPI are inadequate to meet the needs of the TPIRR's customers. *See supra* III-B-3; III-C-75–129. TPI posits 229 yards (including intermodal, automotive, and bulk transfer facilities) that require a total of 7,328.81 acres of land. TPI's valuation of acreage required for yard facilities is inaccurate. Because TPI did not properly configure or size its yards, the number of acres valued is grossly insufficient. In comparison, CSXT's TPIRR configuration adds five "other" yards, seventeen interchange yards, two partially owned yards, three intermodal facilities, and one coal pier facility for a total of 257 yard facilities, all of which are specifically sized and configured to handle the necessary classification and blocking of the 2.8 million carloads of merchandise traffic that TPI selected. *See* CSXT Reply III-C-126–29. Those yards and support facilities require 10,855 acres of land. CSXT valued the land required for the yards and support facilities using the same value per acre applied to the adjacent TPIRR right-of-way. *See* CSXT Reply WP "TPI Yards and Land Values – ALL YARDS_Reply Acreage.xlsx." Because some of the yards fall along the portions of the TPIRR valued during inspection using a 2008 date of value, the total value of yards has been broken out into 2010 and 2008 values. 9,602 acres of land required for yards and facilities have been valued at $767.3

million using a 2010 valuation date, and the remaining 1,253 acres have been valued at $659 million using a 2008 valuation date. *Id.*[9]

CSXT does not dispute the acreage or placement of the microwave tower communications sites TPI includes in their evidence. *See infra* III-F-6-c. Accordingly, CSXT accepts TPI's estimate of land values for microwave communication sites.

e. Real Estate Acquisition Costs

Separate and apart from the cost of acquiring the land necessary for the TPIRR ROW and other facilities, TPIRR would also incur additional costs for acquiring that land. TPIRR failed to include any of those necessary costs, and instead assumed that TPIRR could acquire land at its appraised value with zero transaction costs. Such an omission understated TPIRR land acquisition costs because, in the real world, a railroad purchasing real estate—just like an individual buying a home—must pay not only the purchase price of the land, but also the associated transaction costs of acquiring that land, including title work, surveys, appraisals, negotiations, and closing costs.[10] Indeed, the costs that accompany any land acquisition are particularly significant for right-of-way acquisitions, because such acquisitions typically involve purchasing land that is not presently on the market and require labor-intensive efforts to identify and negotiate with landowners. These costs are separate and apart from the Across-the-Fence valuation of the land to be acquired by the TPIRR, and CSXT's appraiser specifically excluded these costs from his appraisal report.[11]

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[9] All 2008 values were inserted directly into the DCF while 2010 values are indexed following TPI's methodology.

[10] When condemnation proceedings become necessary, railroads also must pay the associated litigation costs. These costs are ignored for purposes of this analysis, as it is assumed that the TPIRR would be able to purchase the land without the need for eminent domain.

[11] *See* CSXT Reply Exhibit III-F-1 at 44 ("The following acquisition costs are disregarded: brokerage fees; legal and accounting fees; insurance; surveys; appraisals; title search; transfer

The Board has recognized that SARRs would incur real estate acquisition costs. *See DuPont*, STB Docket No. 42125, at 141 ("The Board . . . considers these to be transaction-specific costs which the [SARR] should reasonably expect to incur while purchasing each parcel of needed real estate."); *SunBelt*, STB Docket No. 42130, at 104. CSXT's experts have developed a reasonable estimate of the additional costs associated with the acquisition of land for the TPIRR, and these costs should be included in TPIRR's road property investment costs.

CSXT witness Hedden has developed a conservative estimate as to what the TPIRR would have to pay for real estate acquisition costs on a per parcel basis. First, Mr. Hedden conservatively assumed that the TPIRR consists of 80,000 parcels, or approximately ten acres per parcel. Second, Mr. Hedden calculated costs for tasks that would be required for the TPIRR to acquire each parcel. These costs and tasks are set forth in Table III-F-3.

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taxes; landowner association fees; special assessments; permits for non-conforming use; subdivision fees; condition assessments and surveys; demolition, relocation or rehabilitation of improvements on abutting parcels; severance damages; and damages for creating any landlocked parcels not included in the acquisition."). TPI's appraisal similarly "reflects a baseline fee simple land value for the entire TPI Stand Alone Railroad." TPI Op. Ex. III-F-2 at 13.

TABLE III-F-3
Estimated Acquisition Costs

Title Work	$500
Survey	$5,000
Appraisal	$2,000
Negotiation consultant	$3,000
Closing Costs* **Note: Closing costs consist of $1,500 for title insurance, $900 for closing fees, and $100 for recording fees.*	$2,500
Total cost per parcel	$13,000
Estimated number of parcels (estimated average parcel size: 10 acres)	$8,000
Estimated Acquisition Cost	**$104,000,000**

This estimate is founded on conservative assumptions regarding the costs the TPIRR would incur to acquire the necessary land based upon Mr. Hedden's extensive experience in the field of right-of-way acquisition. Mr. Hedden based these costs on industry standards and documents from related engagements. These costs were also verified by several real estate professionals with extensive experience in right of way acquisitions. *See* CSXT Reply WP "Acquisition Costs Memo.pdf." Moreover, these costs are in line with those accepted by the Board in *DuPont* and *SunBelt*. *DuPont*, STB Docket No. 42125, at 139; *SunBelt*, STB Docket No. 42130, at 104

An acquisition cost of $104 million represents roughly 2-3% of the total land value assessed for the TPIRR. Based upon Mr. Hedden's experience, acquisition costs in the 2-3% range are reasonable and appropriate. Accordingly, CSXT has included a cost to the TPIRR of

$104 million in expenses for real estate acquisition separate and apart from the cost of the land itself.

i. Conclusion

In sum, CSXT's physical inspection and resulting appraisal reflects a more accurate valuation of the major metropolitan areas traversed by the SARR, and follows well-established Board precedent regarding the valuation of easements. CSXT's appraisal appropriately values the land along the partially owned lines that the TPIRR will have to acquire and accounts for all of the land necessary for TPIRR's yard and communications facilities. As a result, CSXT's appraisal produces a more accurate valuation and should be accepted. Table III-F-4 provides a summary of the components of CSXT's land valuation.

Table III-F-4[12]

Component of Valuation	2008 Value	2010 Value
TPI Fee Simple Land Value	$ -	$ 3,462,700,000
Less: TPI Value for Sites CSXT Visited	$ -	$ (1,775,273,132)
Plus: CSXT Fee Simple Land Value- Lines also valued by TPI	$ 2,811,861,619	$ -
Plus: CSXT Fee Simple Land Value- Lines not valued by TPI	$ 74,064,154	$ -
TPIRR Fee Simple Land Value	$ 2,915,477,000	$ 1,687,426,868
Plus: Land for Communications Facilities	$ -	$ 31,900,000
Plus: Land for Yards & Other Support Facilities	$ 659,010,812	$ 767,377,035
Plus: Cost of Easements	$ 18,443,818	
Less: Fee Simple Land Value for Easement Areas	$ (52,263,691)	$ (615,171,781)
Net Land Valuation for TPI Stand Alone Railroad	$ 3,540,667,939	$ 1,871,532,122

2. Roadbed Preparation

The roadbed preparation section of the CSXT Reply is sponsored by CSXT witnesses Michael Baranowski, Paul Bobby, Patrick Bryant, and Robert Phillips. Mr. Baranowski is a

[12] Values as of 2008 are included directly into the DCF and are not indexed. Values as of 2010 are indexed based upon TPI's methodology.

Senior Managing Director at FTI Consulting and has over thirty years of experience in transportation analysis. Mr. Baranowski has testified in numerous Board proceedings and stand-alone cost cases, and sponsored evidence in virtually every SAC case since 1997, including sponsoring earthwork and other road property investment evidence in numerous cases. Mr. Bobby is a Project Manager with STV, a firm offering engineering, architectural, planning, design, environmental, and construction management services. He has worked on a number of railroad construction projects and has participated in design of rail roadway and track alignment, cost estimation, and the development of construction staging plans. Mr. Bryant is a Civil Engineer with STV and has more than 20 years of experience in rail, roadway, highway, and bridge design and construction. He has worked as a Rail Engineer on several rail projects for UP, KCS, NS, and CSXT. Mr. Phillips is Vice President of the Rail Division of STV and has over 35 years of experience in track design and maintenance, grade crossings, and construction management of rail projects. Mr. Phillips has also developed road property investment evidence in several prior SAC cases. These experts' qualifications are further detailed in Section IV.

TPI made several fundamental errors and omissions in calculating roadbed preparation costs that result in an understatement of those road property investment costs for the TPIRR. In this section CSXT identifies and explains the problems with TPI's opening roadbed preparation cost evidence and explains the bases for its proposed corrections. A summary comparison of CSXT's roadbed preparation costs with those submitted in TPI's opening evidence is presented in Table III-F-5.[13]

[13] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Summary."

Table III-F-5
TPIRR Earthwork Quantities
TPIRR Roadbed Preparation Costs CSXT Reply

	Category	TPI Open	CSXT Reply	Difference
1	Clearing & Grubbing	$97,568	$154,018	$56,450
2	Earthwork			
	a) Common	$679,312	$2,199,806	$1,520,494
	b) Loose Rock	$405,257	$451,457	$46,200
	c) Solid Rock	$1,053,457	$1,126,700	$73,243
	d) Borrow	$792,769	$891,737	$98,968
	e) Land for Waste Excavation	$215,642	$532,284	$316,642
	f) Total	$3,146,437	$5,201,984	$2,055,547
3	Drainage			
	a) Lateral Drainage	$69,355	$69,918	$563
4	Culverts	$124,892	$136,637	$11,745
5	Retaining Walls	$223,901	$311,120	$87,219
6	Rip Rap	$76,796	$77,921	$1,125
7	Relocation of Utilities	$738	$738	$0
8	Topsoil Placement / Seeding	$1,476	$1,476	$0
9	Surfacing for Detour Roads	$4,333	$4,333	$0
10	Environmental Compliance	$890	$890	$0
11	Subgrade Preparation	$0	$75,158	$75,158
12	Fine Grading	$0	$104,666	$104,666
13	**Total**	**$3,746,386**	**$6,138,859**	**$2,392,473**

Source: CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx"

a. The Small Atypical Trestle Hollow Project Cannot be Used to Estimate Roadbed Preparation Costs for a 7000-mile Class I Railroad.

Much of the difference in the parties' earthwork costs is driven by the fact that, contrary to well-established Board precedent favoring the use of R.S. Means construction costs data for common earthwork excavation, clearing and grubbing, and seeding, TPI instead proposes to base all of these costs on a single atypical, 1.3 mile line relocation project in rural Tennessee, and extrapolate them to the entire 6,866 route-mile TPIRR.[14] The small, unrepresentative line relocation project on which TPI relies, the "Trestle Hollow Project" conducted for the South Central Tennessee Railroad near Centerville, Tennessee, is not even located along any portion of the CSXT network replicated on the TPIRR.

i. STB Precedents Compel Rejection of TPI's Proposed Use of Trestle Hollow Project Costs in this Case.

The Board's recent decisions in the *DuPont* and *SunBelt* cases foreclose TPI's identical argument regarding the Trestle Hollow Project in this case. In *DuPont* and *SunBelt,* the Board squarely rejected the use of the very same small atypical project as the basis for earthwork unit costs. *See DuPont*, STB Docket No. 42125, at 146-49; *SunBelt*, STB Docket No. 42130, at 105-108. Using the same consultant, witness, and counsel representing TPI in this case, the complainant in *DuPont* sought to extrapolate costs from the very same short Trestle Hollow project to a SARR of approximately the same size and geographic scope as the TPIRR. *See id.* The Board rejected the complainant's request that it rely on the inapposite Trestle Hollow work, concluding:

> The size, scope, and geographic and topographic diversity of the [SARR] make the use of Means more appropriate than the extrapolation of costs from a single project.

DuPont, STB Docket No. 42125, at 149 (adopting R.S. Means costs proposed by defendant carrier).

Complainants in *SunBelt* attempted to apply the Trestle Hollow costs to a much smaller SARR, and the Board again rejected Complainant's attempt to extrapolate from a small atypical project to a larger rail system. *SunBelt*, STB Docket No. 42130, at 107. For present purposes,

[14] As discussed in Section III-F-3, TPI also inappropriately relies on this isolated, unrepresentative project for sub-ballast costs.

the *DuPont* and *SunBelt* cases are indistinguishable from the present case. The TPIRR is roughly the same size as the SARR in *DuPont*, and far larger and more geographically dispersed than the SARR in *SunBelt*. TPI offers no meaningful arguments or evidence to distinguish its Trestle Hollow-based argument in this case from the same approach the Board rejected in *DuPont* and *SunBelt*. The Board's analysis and conclusion in *DuPont* and *SunBelt* apply equally to this case, and compel the same result—TPI's unrealistic and inapposite unit costs for roadbed preparation should be rejected and the Board should adopt the R.S. Means costs presented by CSXT.

ii. Further Reasons Trestle Hollow Costs Cannot Be Used for the TPIRR.

The following discussion further demonstrates that a long line of Board precedent and the radically different parameters and nature of (1) the Trestle Hollow project from (2) the construction of the nearly 7,000-mile TPIRR require rejection of the costs proffered by TPI and adoption of the R.S. Means-based cost evidence presented by CSXT in this Reply.

The Board has long applied R.S. Means national cost data as the appropriate, authoritative source for earthwork costs. Indeed, in nearly every SAC case, the Board has applied R.S. Means as the best source of earthwork construction costs, as well as other road property investment unit costs. In *FMC,* for example, the Board applied R.S. Means in calculating the appropriate unit costs for earthwork. *FMC,* 4 S.T.B. at 800. In *Duke/CSXT,* the Board relied on R.S. Means costs. *Duke/CSXT,* 7 S.T.B. at 171; *see also CP&L,* 7 S.T.B. at 310. In *Otter Tail,* the Board accepted R.S. Means unit costs. *Otter Tail,* STB Docket No. 42071, at D-11.[15] Most recently, and directly on point, the Board repeatedly rejected the very same Trestle

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[15] *See also West Texas,* 1 S.T.B. at 704 (accepting Complainant's "unit costs for earthwork as reasonable, because they are based upon actual quotations obtained from the construction industry and recognized compilation services" where the Complainant used R.S. Means); *PPL v. Montana,* 6 S.T.B. 286, 305, n.26 (applying Complainant's unit cost for excavation, based on R.S. Means); *TMPA I,* 6 S.T.B. at 705 (using Complainant's culvert costs estimate based on R.S.

Hollow evidence and adopted R.S. Means costs. *See DuPont*, STB Docket No. 42125, at 149; *SunBelt*, STB Docket No. 42130, at 105.

TPI erroneously claimed the Board's 2007 decision in *WFA I* and its 2011 decision in *AEPCO* support TPI's twice rejected approach of using a small, short-line project that is unrelated to the SARR network as the basis for earthwork unit costs for construction of a very large SARR.[16] In *WFA I,* defendant BNSF produced actual construction unit costs for common excavation and embankment from its then-recently-completed Shawnee-to-Walker Third Main line construction project on the Orin line. At approximately 126 miles,[17] the BNSF's Orin line comprised the majority of the actual route replicated and traversed by the relatively short 218 mile SARR proffered by complainants in *WFA 1.*[18] Defendant BNSF accepted the use of its own actual costs of the very lines replicated by the SARR for common excavation costs in that proceeding. *See WFA I,* STB Docket No. 42088, at 86. Unlike the evidence and circumstances

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Means); *Duke/CSXT,* 7 S.T.B. at 479 (complainant's unit cost for blasting, based on R.S. Means, is used); *Xcel,* 7 S.T.B. at 616 (R.S. Means is "a set of nationwide standardized unit costs that is often relied upon in SAC cases to estimate construction costs."); *Id.* at 677 ("Xcel's common excavation costs are supported by *Means* ... Xcel's cost figures for common excavation are used here ... Xcel's equipment specifications are used here because they are supported by *Means");* *Arizona Pub. Serv. Co. v. Atchison, Topeka & Santa Fe Ry. Co.,* STB Docket No. 41185, at 27 (served July 27, 1997) (accepting Complainant's R.S. Means-based index); *WFA I,* STB Docket No. 42088, at 86 (applying Complainant's R.S. Means-based excavation costs); *Id.* at 86-87 (accepting Complainant's "Means costs for 'drilling and blasting ... and 'bulk drilling and blasting'"); *AEP Texas II,* STB Docket No. 41191, at 79 ("For segments that would require both clearing and grubbing, AEP Texas uses the R.S. Means Manual (Means) cost"); *AEPCO 2011,* STB Docket No. 42113, at 83-84 ("AEPCO submits separate unit costs for clearing and grubbing, using Means to determine its unit costs ... Therefore, we accept AEPCO's unit costs for clearing as the best evidence of record. We use the agreed-upon grubbing unit costs.").

[16] *See* TPI Opening III-F-13 to III-F-14.

[17] The BNSF Orin Line extends generally from MP 0 near Donkey Creek, WY to MP 126.2 at Orin Junction, WY. *See* CSXT Reply WP "BNSF Orin Line.pdf."

[18] *See WFA I,* STB Docket No. 42088, at 25-26, 81-82. The Shawnee-to-Walker construction project comprised 14 miles of the 126 mile Orin line. *See* CSXT Reply WP "UP and BNSF AEPCO Public Reply Excerpt — Project Miles.pdf."

in *WFA I,* (1) the Trestle Hollow Project was not constructed by CSXT and is not part of the CSXT or TPIRR system; (2) the Trestle Hollow project was tiny in size and scope in comparison to the TPIRR; and (3) Defendant CSXT does not accept the use of Trestle Hollow costs.

Similarly, in *AEPCO 2011,* the complainant based its common excavation unit costs on the average costs of five actual BNSF capacity expansion projects covering nearly 77 miles on the Orin and Hereford Subdivisions, based upon actual construction cost documents and materials produced by BNSF in discovery. Unlike *AEPCO 201,* the Trestle Hollow Project short line is not a project on the lines of the defendant carrier. Indeed, Trestle Hollow is not even a project on a Class I railroad like the TPIRR.

In both *WFA I* and *AEPCO 2011,* due primarily to the projects' proximity to the route being replicated by the SARR and the fact that the proffered costs were from larger projects conducted by the defendant itself on a Class I railroad system, the Board accepted the use of defendant railroads' own actual experience and costs for common excavation for estimating SARR common excavation costs.[19] Neither *WFA I* nor *AEPCO 2011* provides any basis for using the costs of a small project on a foreign short-line as the basis for calculating the costs of constructing a SARR that purports to replicate the core of a Class I carrier's network. The projects used to derive construction costs for both *WFA I* and *AEPCO 2011* were far larger than the 7,000 feet Trestle Hollow Project, and far closer in geographic proximity and topography to the lines being replicated by the SARRs involved in those cases. The unit costs proffered by TPI in its opening evidence are not those of the incumbent carrier on the SARR route as in *WFA I* and *AEPCO 2011.* TPI, instead, attempts to extrapolate costs from a small, and atypical short-

[19] *See WFA I,* STB Docket No. 42088, at 86 (explaining that the parties agreed on the cost for common excavation); Joint Reply Evidence and Argument of Defendants BNSF Railway Co. and Union Pacific Railroad Co., *Arizona Elec. Power Coop., Inc. v. BNSF Ry. Co. & Union Pac. R.R. Co.*, STB Docket No. 42113, at III-F-22 (May 7, 2010).

line construction project on the South Central Tennessee Railroad in middle Tennessee. The size, scope, and range of different conditions encountered by the TPIRR make it much more suited to use of R.S. Means average costs than to extrapolation from any single project—particularly gross extrapolation from a small, atypical project like Trestle Hollow, which was conducted on a short-line not replicated by the TPIRR.

Even if it were otherwise appropriate to extrapolate unit costs for a 7,000 foot short-line relocation project to a nearly 7,000 mile SARR—and as the Board held in *DuPont* and *SunBelt*, it is not—there are many reasons that the South Central Tennessee Railroad's purported costs on a construction project that was not even located on lines replicated by the TPIRR are not applicable, reliable, or appropriate estimates for this case:

- Even if TPI's very low unit price for mass excavation in the small Trestle Hollow Project were otherwise accurate for that particular project, CSXT's Engineering Experts have determined the project's unit price is a function of high concentration of excavation volumes within a small geographic area. According to workpapers and plan documents provided by TPI, Phase 1 of the Trestle Hollow Project, upon which TPI based its unit prices, involved 636,102 cubic yards of excavation, or nearly one-half million cubic yards per mile.[20]

- Total earthwork proposed by TPI for construction of the TPIRR including common, loose, solid rock excavation, and borrow would average less than 75,000 cubic yards per mile,[21] only 15.6 percent of the excavation cubic yards per mile in the Trestle Hollow Project (using TPI's volume assumption). Common excavation volume posited by TPI for the TPIRR averages slightly more than 44,000 cubic yards per mile[22] or just 9.2 percent of the Trestle Hollow Project excavation cubic yards. The economies realized by the Trestle Hollow Project contractor from conducting all of its work in a small concentrated area would not be available to the TPIRR contractors. CSXT's Engineering Experts have determined that those economies likely were realized through shorter equipment

[20] *See* TPI Op. WP "5070 Full Set.pdf," at 5 showing Phase 1 project excavation quantities of 636,102 cubic yards.

[21] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "EW Costs," cell E330 divided by Tab "CY Grad by seg," cell H321.

[22] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "EW Costs," cell L330 divided by Tab "CY Grad by seg," cell H321.

cycles for excavating and transporting materials along the right of way, which tremendously increases the productivity of the manpower and equipment.[23]

- TPI asserts that the Trestle Hollow project was challenging due to hilly terrain and that some of its bid unit prices are conservative.[24] In fact based on their review of aerial photography of the area[25] and documents provided in TPI's workpapers, CSXT's Engineering Experts determined there is no evidence that the Trestle Hollow project was particularly complicated or unusually challenging. It simply involved moving high volumes of materials very short distances.

- Grading contractors working on the Trestle Hollow Project had the significant cost-saving advantages of a wide right-of-way that provided ample width for vehicle turning; inadvertent over-excavation; and haul roads adjacent to the roadbed under construction. TPI's Trestle Hollow Project construction plans show ROW widths varied from 300' to 400'.[26] TPI's case-in-chief presented on Opening limited TPIRR rights-of-way widths to 75 feet and 100 feet, which would constrain grading operations significantly, because equipment operators would be required to exercise special care not to encroach on adjacent properties, and equipment would be allowed less mobility, thereby reducing productivity.[27] Moreover, the lack of hauling roads along the TPIRR right-of-way would force its construction haulers to use the railroad roadbed during construction, thereby further reducing equipment productivity.

- The Trestle Hollow Project required that less than 20% of excavated materials be reused as embankment and that over 80% of the excavation would be wasted.[28] In contrast, TPI's opening evidence specifies that 70% of excavated materials would bear the added cost of being placed in the right of way, compacted and shaped as embankment, while it assumed only 30% of all excavation would be wasted.[29]

- According to the soil boring reports prepared by Qore Property Sciences and provided by TPI as part of the overall bid package on the Trestle Hollow Project,

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[23] As an example, R.S. Means data show that Hauling unit costs increase as haul distance increases (directly related). *See* CSXT Reply WP "R.S. Means increase.pdf."

[24] *See* TPI Opening III-F-15.

[25] *See* TPI Op. WPs "Aerial_Photos #1.pdf" and "Industrial Map.pdf" in Trestle Hollow Pictures subfolder. These pictures show easy access to a major highway and that the area appears to have been partly clear cut by previous logging.

[26] *See* TPI Op. WP "5070 Full Set.pdf."

[27] *See* TPI Opening III-F-3.

[28] *See* TPI Op. WP "5070 Full Set.pdf" page 5 showing project excavation quantities of 636,102 cubic yards of which 122,924 cubic yards, or 19.3% are placed on right of way.

[29] *See* TPI Opening III-F-18.

the in-situ moisture contents of the soils tested at the project site were nearly optimal.[30] This means little, if any, additional watering or drying was needed for compaction. Encountering soils with such optimal moisture content is atypical and, as explained below, quite unlikely for the majority of the terrain traversed by the TPIRR. CSXT's Engineering Experts used Web Soil Survey ("WSS"), to analyze the soils along the TPIRR to estimate its moisture content. Of the 250 grading segments along the TPIRR, 77 were found to be outside the optimum moisture content level and would require either additional water to achieve specified compaction or drying of material before compaction.[31] *See infra* III-F-2-c-ii-(h).

- The Trestle Hollow project site is situated along the east side of Trestle Hollow, a small northeast trending valley in the Indian Creek drainage near Centerville, TN. The project is situated entirely within the Highland Rim physiographic section of the Interior Low Plateaus province, which in turn is part of the larger Interior Plains physiographic division. With the exception of a few broad stream bottoms, the land in the Highland Rim section is characterized by ridges and valleys with a few fairly low hills. In contrast, the TPIRR route traverses three physiographic divisions, nine physiographic provinces, and 29 physiographic sections. Terrains in these physiographic sections vary from coastal lowlands with swamps to rugged mountain ranges.

As summarized above, the earthwork excavation experienced on the Trestle Hollow Project is not at all representative of the common excavation that would be encountered by the TPIRR.

iii. TPI's Fabricated Rationale.

In an effort to avoid the use of actual costs that CSXT has actually incurred for earthwork activities, TPI complained that CSXT produced in discovery only a limited volume of documents containing earthwork cost information.[32] TPI further claimed that because the documents relate to projects involving additions or modifications to existing track and rights of way adjacent to active tracks, and not new line construction, the Board should reject CSXT's actual costs as not

[30] *See* TPI Op. WP "Trestle Hollow Specifications.pdf," at 226 — "Report of Geotechnical Exploration Services."

[31] *See* CSXT Reply WP "STATSGO2_GIS_Soils_TPIRR with Water Content.xlsx" and CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "EW Cost."

[32] *See* TPI Opening III-F-14.

representative of the costs of constructing the TPIRR, which would replicate CSXT lines.[33] But TPI makes no attempt to explain how the actual project costs that CSXT produced in discovery are distinguishable from those it touts as reliable from *WFA I* and *AEPCO 2011*. The BNSF projects whose costs the Board accepted in those cases similarly involved additions or modifications to existing track and rights of way adjacent to active tracks. The salient difference is rail roadbed construction costs more in the East than in the western areas at issue in the cases TPI cites—the actual western railroad project costs used in *WFA I* and *AEPCO 2011* do not reflect the higher actual cost of constructing railroad roadbed in the east.

TPI's rejection of CSXT's actual roadbed construction projects is unfounded. In response to TPI's requests in two rounds of discovery related to earthwork costs, CSXT identified Authorizations for Expenditure ("AFE") for all CSXT track construction projects completed during the time period from 2000 through June 2013.[34] The CSXT AFE list included information for 2,197 separate AFEs covering more than $1.8 billion of CSXT capital expenditures for track construction during the relevant period.[35] TPI selected 51 AFEs from the list provided by CSXT for detailed review.[36] Fourteen of the AFEs selected by TPI included earthwork activities, for which CSXT provided detailed contractor invoices in addition to other project and expenditure details. An additional eighteen earthwork projects were documented in

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[33] *See id.*

[34] The first discovery round initially included AFEs between 2007 and 2010, and was supplemented to include track construction AFEs between 2000 and 2006. The second discovery round included AFEs between 2011 to 2013.

[35] *See* CSXT Reply WP "AFE List.xlsx."

[36] *See* T. Crowley Letter to J. Moreno (Aug. 26, 2010) and J. Moreno Email to M. Warren (Oct. 7, 2013).

engineering contracts requested by TPI.[37] During the update of discovery materials in 2013, CSXT identified three additional track construction projects included on the list provided to TPI in the second round of discovery that contained earthwork activities.[38] CSXT gathered detailed contractor invoices for those projects and produced them to TPI.[39] Table III-F-6 summarizes the earthwork- related AFE detail CSXT provided to TPI in discovery.

Table III-F-6
Summary of Earthwork Costs From CSXT AFEs and Engineering Contracts Produced to TPI

Discovery:	Period:	Track Construction AFEs Listed:	Track Construction AFEs Requested:	AFEs Including Earthwork Cost Information:	Engineering Contracts with Earthwork Cost Information:
First	2000-2006	444	36	10	12
First Supplemental	2007-2010	1462	0	0	0
Second	2010-2013	291	15	4	6
Total Requested by TPI		*2197*	*51*	*14*	*18*
CSXT Additions in Second Discovery				*3*	*0*
Total Projects in Discovery with Earthwork Cost Information:				**35**	

Source: CSXT Reply WP "CSXT Actual Earthwork Costs.xlsx"

Overall, CSXT produced detailed cost information—including contractor invoices—for all of the above thirty-five grading projects. Overall these projects included nearly 1.3 million cubic yards of earthwork associated with the construction of 64 miles of track. Sixteen of these

[37] TPI requested these in RFP 98. *See* CSXT Reply WP "CSX Actual Earthwork Costs.xlsx," Tab "Table 1."

[38] *See* CSXT Reply WP "CSX Actual Earthwork Costs.xlsx," Tab "Table 1."

[39] TPI objected to CSXT providing information on these five projects on the basis it may have cherry-picked favorable cost information. *See* J. Moreno Letter to M. Warren (Nov. 12, 2013). Even absent these projects CSXT still produced information for 30 grading projects. Moreover, as demonstrated below, the five projects CSXT selected have lower costs than those selected by TPI.

projects involved over 20,000 cubic yards each, and six were over 60,000 cubic yards. TPI ignored the costs from all of these projects.[40] TPI has not described the criteria it evaluated in reaching its conclusion that the actual CSXT projects were unfit for its purposes, nor did it seek to review any additional CSXT projects after reaching this conclusion. Table III-F-7 summarizes the relevant details of the earthwork costs for CSXT earthwork projects provided to TPI:

[40] TPI Opening III-F-14.

Table III-F-7
Summary of Earthwork Costs From CSXT AFEs and Engineering Contracts Produced to TPI

Details		Miles	Cubic Yards			
AFE	Discovery	Grading Project Track Miles	Unclassified / Common	Embankment / Fill	Rock Excavation	Total
A32943	First - TPI	1.89	55,000	-	-	55,000
A37256	First - TPI	1.62	3,000	4,050	-	7,050
A37260	First - TPI	1.44	1,000	2,000	-	3,000
A37261	First - TPI	1.42	1,800	-	-	1,800
A37298	First - TPI	1.55	3,400	-	-	3,400
A37600	First - TPI	0.30	620	832	-	1,452
A38166	First - TPI	1.90	4,222	6,333	-	10,555
A38167	First - TPI	1.20	6,000	15,000	-	21,000
A39515	First - TPI	na	51,394	4,636	28,843	84,873
C20257	First - TPI	na	5,459	-	-	5,459
JMG	First - TPI	1.33	85,650	-	5,800	91,450
Polivka	First - TPI	3.10	41,900	1,900	10	43,810
A29323	First - TPI	1.10	3,455	3,501	-	6,956
A31914	First - TPI	1.89	16,202	30,891	-	47,093
A31929	First - TPI	4.17	36,563	34,121	-	70,684
A32416	First - TPI	na	58,307	12,082	-	70,389
A32889	First - TPI	0.43	25,645	-	-	25,645
A32912	First - TPI	2.90	19,385	-	-	19,385
A36040	First - TPI	1.70	15,230	25,270	-	40,500
A36801	First - TPI	2.25	126,730	26,432	-	153,162
A37672	First - TPI	3.30	4,790	5,920	-	10,710
A38702	First - TPI	0.38	11,000	-	-	11,000
Polivka2	Second - TPI	1.37	48,000	-	50	48,050
A39359	Second - TPI	0.21	700	-	-	700
a40239	Second - TPI	na	9,200	6,000	325	15,525
A41707	Second - TPI	1.80	10,800	4,700	-	15,500
A41713	Second - TPI	2.27	7,794	9,604	-	17,398
A41876	Second - TPI	na	1,137	1,646	-	2,783
A39788	Second - TPI	0.20	5,150	-	800	5,950
A40306	Second - TPI	3.18	35,668	6,268	-	41,936
A41530	Second - TPI	7.60	54,367	27,413	100	81,880
A41668	Second - TPI	1.89	18,690	39,438	18,267	76,395
A39747	CSXT Added	4.17	112,400	48,100	17,000	177,500

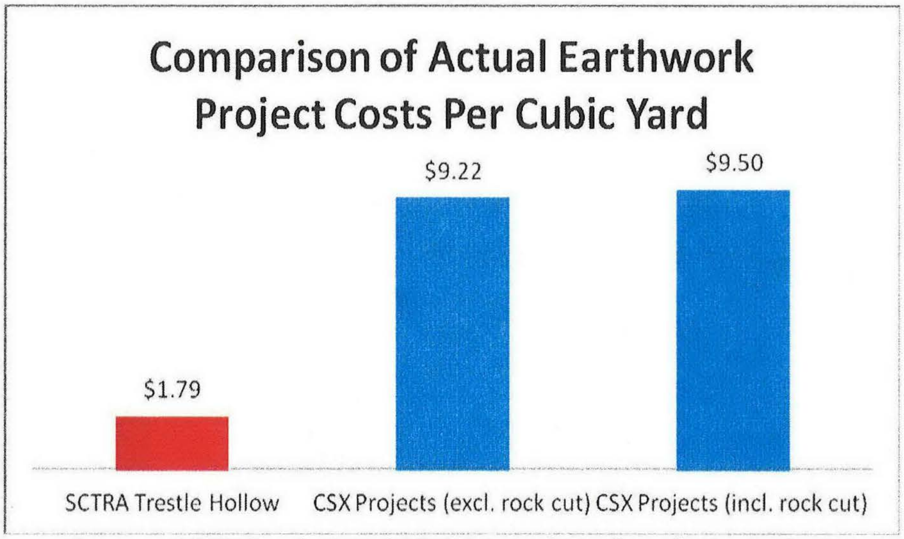
Details		Miles	Cubic Yards			
AFE	Discovery	Grading Project Track Miles	Unclassified / Common	Embankment / Fill	Rock Excavation	Total
A39855	CSXT Added	7.40	11,000	1,000	-	12,000
A41422	CSXT Added	na	187	-	-	187
Earthwork Quantities						
All Projects		63.97	891,845	317,13	71,195	1,280,17
Less CSXT Added		52.40	768,258	268,03	54,195	1,090,49
Earthwork Unit Costs (Weighted Average, Indexed to 2010)						
All Projects			$9.37	$8.78	$14.28	$9.50
Less CSXT Added			$9.88	$8.93	$13.11	$9.80

Source: CSXT Reply WP "CSXT Actual Earthwork Costs.xlsx"

TPI failed to acknowledge the real reason it seeks to dismiss CSXT's real-world earthwork unit costs—that those actual costs are well above those of the unrepresentative Trestle Hollow Project and well above earthwork costs developed from R.S. Means construction cost data, upon which most Board decisions have relied.[41] Below Table III-F-8compares the earthwork costs actually incurred by CSXT in the AFEs and engineering contracts produced to TPI (indexed to 2010 levels) with the Trestle Hollow Project costs proffered by TPI.

[41] *See, e.g., FMC,* 4 S.T.B. at 800; *WP&L,* 5 S.T.B. at 1020, n.147; *Duke/CSX,* 7 S.T.B. at 171; *CP&L,* 7 S.T.B. at 310; *Xcel,* 7 S.T.B. at 616; *Otter Tail,* STB Docket No. 42071, at D-11.

Table III-F-8



Source: CSXT Reply WP "CSXT Actual Earthwork Costs.xlsx"

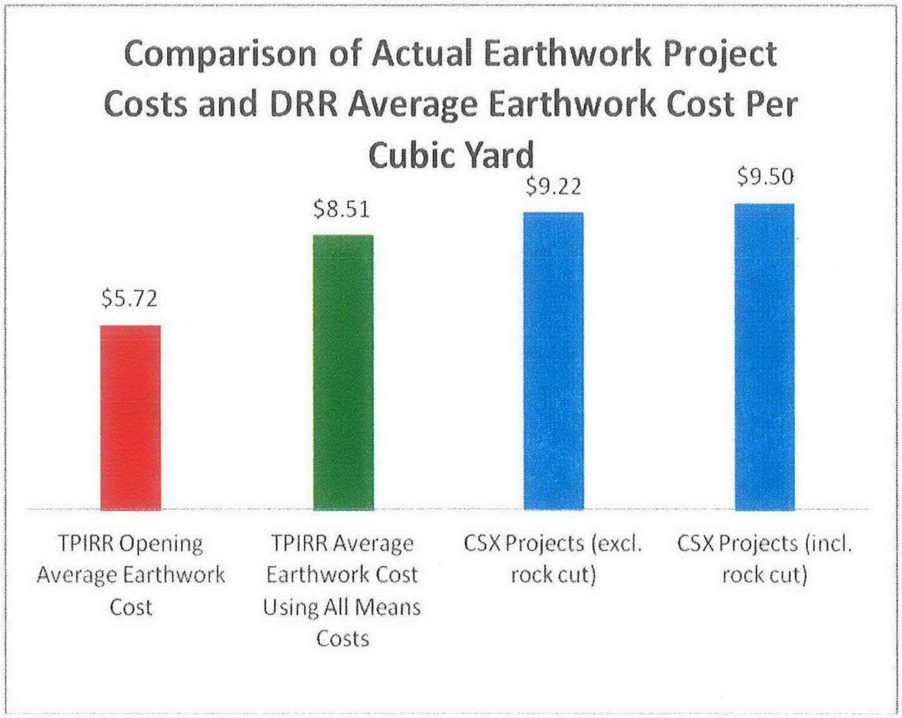
As Table III-F-8 shows, the Trestle Hollow Project costs are far out of line with CSXT's actual earthwork project experience.

The CSXT AFE documents do not in all cases provide separate unit costs for common, loose rock or solid rock excavation so the cost per cubic yard reflected in Table III-F-7 are the average cost for all categories of earthwork in each of the representative projects. In SAC cases, earthwork quantities typically are separated into individual classifications of common excavation, loose rock excavation, solid rock excavation, and borrow.[42] In order to evaluate the reasonableness of the TPIRR earthwork unit costs, it is useful to compare the overall project cost per cubic yard from the CSXT AFEs and engineering contracts to the overall average TPIRR earthwork costs. Table III-F-9 below compares (i) the average TPIRR cost per cubic yard for common, loose rock and solid rock excavation and borrow from TPI's opening evidence, which includes use of the Trestle Hollow Project unit cost for common excavation to (ii) TPI's average TPIRR cost per cubic yard if, as in past cases, TPI's costs were calculated using R.S. Means for

[42] *See, e.g., Xcel,* 7 S.T.B. at 676.

all earthwork costs. (*i.e.*, if R.S. Means unit costs were substituted for the Trestle Hollow project-based costs TPI inserted in its opening evidence).

Table-III-F-9



Source: CSXT Reply WP "CSXT Actual Earthwork Costs.xlsx."

Table III-F-9 shows that even when R.S. Means is used to develop the TPIRR cost for common excavation, the overall earthwork average project cost for the TPIRR would remain well below CSXT's actual costs in the AFEs provided to TPI in discovery. This is because the Trestle Hollow Project costs assumed by TPI for TPIRR common excavation are unrealistically low outliers that produce average TPIRR earthwork costs that are a fraction of the costs actually incurred by CSXT for earthwork for the AFE projects produced to TPI in discovery.[43] Table III-F-9 shows that composite TPIRR costs using R.S. Means cost data for common excavation costs,

[43] As Table III-F-9 shows, TPI average cost for all TPIRR earthwork activities is only slightly higher than the Board-accepted, R.S. Means-derived unit price for common excavation alone.

while still conservatively lower than the CSXT actual experience, are more in line with reasonable, achievable costs on a more typical railroad construction project.

b. Clearing and Grubbing

Clearing is the process of removing brush and trees (leaving roots and stumps), and is the initial step in roadbed preparation. Clearing quantities from the ICC Engineering Reports can be divided into two general types based on the type of plant cover and degree of difficulty of clearing. The first type is clearing areas having primarily smaller brush and few trees. This entails using a rake to cut the brush, and stockpiling the cut material. The stockpiled brush is then loaded into trucks and hauled to a waste site. The second type is clearing areas with more and/or larger trees, a more arduous undertaking that involves cutting and chipping the trees.

Grubbing is the process of removing tree roots and stumps left by clearing of the areas with trees. Grubbing is required for areas with trees, but generally is not required for areas primarily covered with brush and smaller vegetation.[44]

i. Clearing and Grubbing Quantities and Costs

CSXT accepts TPI's proposed method of determining clearing quantities and grubbing quantities and the resulting clearing and grubbing quantities.[45] However, CSXT rejects TPI's proffered clearing and grubbing unit costs. In past cases, clearing and grubbing costs have been split into two separate categories—those for acreage containing trees that require both the clearing of trees and the grubbing of stumps and those for land without trees that require only light clearing to remove and dispose of brush.[46] Here, TPI applied a combined clearing and

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[44] *See* CSXT Reply WP "WP III-F-2-a. Clearing and Grubbing Diagram.pdf" (showing what is cleared, and what is grubbed).

[45] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Other Items."

[46] *See, e.g., AEPCO 2011,* STB Docket No. 42113, at 83.

grubbing unit cost of $2,155.46 per acre based upon the Trestle Hollow Project. As CSXT explained in detail in Section III-F-2-a, the Trestle Hollow Project is not comparable—in scale, scope, topography, rock and soil conditions, and other conditions and parameters—to the areas traversed by the far-flung TPIRR system.

In its Decisions in *DuPont* and *SunBelt*, the Board rejected use of clearing and grubbing costs derived from the Trestle Hollow Project by complainants in those proceedings. *DuPont*, STB Docket No. 42125, at 150; *SunBelt*, STB Docket No. 42130, at 108. Here, as complainants did in *DuPont* and *SunBelt*, TPI attempts to justify the use of a one-size-fits-all "combined" cost by claiming that applying this combined unit cost to the total acres requiring clearing is conservative and may "overstate[] the total costs as not all acres have trees or require grubbing." TPI Opening III-F-9. Although not all TPIRR land would require grubbing, TPI's workpapers show its approach is not conservative. TPI's own documents show that the total cost it proposed based on Trestle Hollow unit costs is lower than those costs would have been had TPI used its own calculations of R.S. Means-based unit cost.[47] Overall, use of the R.S. Means derived unit costs would yield clearing and grubbing costs 51% higher than the cost relied upon by TPI.[48] This substantial divergence from the R.S. Means data is far from "conservative."

TPI's opening workpapers show that it did develop separate "alternative" costs for clearing and grubbing, using the R.S. Means Handbook.[49] The R.S. Means Handbook provides a "set of nationwide standardized unit costs, adjusted for localities, used to estimate the cost of

[47] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "Other Items," cell AA337 & cell AA356.

[48] ($147,028.379 - $97,554,410/$97,554.410 =51%)

[49] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "Unit Costs," Rows 122 through 132. Specifically TPI calculates separate unit costs applicable to acreage with trees that require both clearing of trees and grubbing of stumps and acreage without trees that require only the clearing of brush.

construction" that has long been accepted by the Board in SAC cases. *See, e.g., CP&L,* 7 S.T.B. at 310; *Duke/NS,* 7 S.T.B. at 171, n.99; *DuPont*, STB Docket NO. 42125, at 147, n.411. Although TPI decided not to use its R.S. Means-based costs to develop its final TPIRR clearing and grubbing costs, the TPI workpapers nonetheless show most of the relevant R.S. Means unit costs required for clearing and grubbing activities.[50]

Further, TPI has failed to demonstrate that the clearing and grubbing cost per acre from the Trestle Hollow Project is representative of the clearing and grubbing costs that would be incurred in the construction of the TPIRR. The limited supporting documents provided by TPI for the Trestle Hollow Project unit costs account for a mere 30 acres and a unit cost of $2,000 per acre.[51] The documents furnished by TPI do not differentiate between areas that may have been only cleared versus areas that were both cleared and grubbed. Because clearing alone is less expensive than clearing and grubbing, a project with relatively greater area requiring only clearing would have substantially lower costs than one area requiring both clearing and grubbing. The Board rejected this exact same approach using the same vague indefinite Trestle Hollow comparison in both *DuPont* and *SunBelt*. *See DuPont*, STB Docket No. 42125, at 150; *SunBelt*, STB Docket No. 42130, at 107.

In contrast to Trestle Hollow, the ICC Engineering Reports used to develop clearing and grubbing quantities clearly delineate areas along valuation section that were only cleared and areas that were both cleared and grubbed.[52] Without information identifying the ratio of clearing only versus clearing and grubbing from the Trestle Hollow Project—which TPI did not provide— it is impossible to determine if the undifferentiated unit cost from Trestle Hollow is

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[50] *id.*

[51] *See* TPI Op. WP "Trestle Hollow Project Cost Sheet.pdf."

[52] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "Eng Rpt Input," Columns AS and AV.

appropriate to estimate costs of clearing operations and clearing and grubbing operations along the nearly 7,000-mile TPIRR. Consistent with *DuPont*, *SunBelt*, and other precedents, the Board should reject the undifferentiated clearing and grubbing costs proffered by TPI and adopt the separate R.S. Means-based costs for each activity presented by CSXT below.

ii. Cost for Acres Requiring Both Clearing and Grubbing

For land with trees that would require both clearing and grubbing, CSXT rejects TPI's proposed use of the Trestle Hollow Project as the source for TPIRR clearing and grubbing unit costs and adopts TPI's alternative R.S. Means-based approaches set forth in TPI's workpapers.[53] This method develops separate unit costs for clearing, $5,762.65 per acre, based on the R.S. Means cost for cutting and chipping trees up to twelve inches in diameter[54] and for grubbing, $3,833.63 per acre, based on the R.S. Means cost for grubbing and removing stumps.[55]

CSXT's approach is consistent with Board precedent. *See, e.g., AEPCO 2011,* STB Docket No. 42113, at 83 (providing separate R.S. Means unit costs for clearing and for grubbing); *CP&L, 7* S.T.B. at 310 (same). CSXT's Reply Evidence applies these unit costs to the TPIRR acres requiring both clearing and grubbing.[56] This method is consistent with that accepted by the Board in *DuPont* and *SunBelt*. *See DuPont*, STB Docket No. 42125, at 149-50; *SunBelt*, STB Docket No. 42130, at 108.

iii. Costs for Acres Requiring Only Clearing

The alternative R.S. Means-based clearing and grubbing units costs developed, but not used by TPI include a unit cost of $272.51 per acre for areas that require clearing, but not

[53] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "Unit Costs," Rows 125 through 129.

[54] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "Unit Costs," Rows 131 through 132.

[55] *See* TPI Op. WP TPIRR Open Grading.xlsx," Tab "Unit Costs."

[56] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Other Items," Columns Y through AE.

grubbing. CSXT applies TPI's R.S. Means-based cost for clearing and applies it to the TPIRR acreages requiring only clearing.

c. Earthwork

CSXT accepts TPI's general method of determining earthwork quantities from the ICC Engineering Reports (sometimes referred to hereinafter as the "Engineering Reports"). However, TPI made a number of errors in identifying and using the relevant quantities from the Engineering Reports as explained below. CSXT rejects TPI's unit costs for earthwork excavation and land for waste sites. CSXT also corrects TPI's failure to include earthwork costs for certain TPIRR segments in which CSXT has an ownership interest, but TPI erroneously treated them as trackage rights segments. CSXT's Engineering Experts also have adjusted earthwork unit costs to match the R.S. Means reported unit costs for haulage. Finally, CSXT has added costs for finished grading that are not otherwise captured anywhere in TPIRR earthwork costs.

i. Earthwork Quantities from ICC Engineering Reports

CSXT accepts TPI's assignment of valuation sections to the TPIRR route and accepts TPI's method of calculating earthwork quantities by valuation section. CSXT also accepts TPI's designation of adverse terrain along the TPIRR route. CSXT identified and corrected a number of input errors made by TPI when recording ICC Engineering Report quantities. These errors generally consist of minor omissions, incorrect assignments of earthwork categories and simple transposition errors.[57] There is, however, one large error that resulted in a significant understatement of TPIRR earthwork costs. Specifically, TPI treated most of the cubic yards of slag identified in the Engineering Reports as "common excavation." CSXT's Engineering

[57] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply," Tab "Eng Rep Input."

Experts conclude this is an erroneous miscategorization for a number of reasons. First, slag does not occur naturally. Instead, it is a stony waste matter separated from metals during the smelting or refining of ore.[58] Thus, it is unlikely that significant deposits of slag requiring excavation were encountered during the initial construction of the lines being replaced by the TPIRR. Second, according to the National Slag Association, the use of steel slag as an aggregate is a standard practice in many jurisdictions, with applications that include its use in granular base, embankments, engineered fill, highway shoulders, and hot mix asphalt pavement.[59] It is therefore entirely consistent and reasonable to find that the builders of the lines replicated by the TPIRR sometimes used slag as a material for railroad embankments. Third, slag quantities are generally reported in a section of the Engineering Reports that records quantities of materials added to the roadbed (not part of common excavation) such as rip rap.[60] Fourth, the vast majority of the slag quantities recorded in the Engineering Reports are in valuation sections proximate to Pittsburgh, PA where steel mills once generally abounded. Based on the foregoing, CSXT's Engineering Experts believe TPI erroneously includes slag quantities with common excavation and have corrected TPI's error by including slag with other borrow quantities.

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[58] Oxford Dictionaries, "Slag," http://www.oxforddictionaries.com/us/definition/american_english/slag (last visited July 15, 2014).

[59] National Slag Ass'n, "Common Uses for Slag," http://www.nationalslag.org/common-uses-slag (last visited July 15, 2014).

[60] Generally, the practice of the Engineering Reports was to record all of the materials excavated—common, loose rock and solid rock—before team and train overhaul. After overhaul, the Engineering Reports next list materials that are typically placed in the roadbed—rip rap being the best example. The slag in the Engineering Reports is reported after the overhaul and typically within a line or two of reported rip rap quantities. Despite the similar treatment of rip rap quantities and slag in the Engineering Reports, TPI did not classify rip rap quantities as excavated materials.

Correcting this error alone adds approximately 9,200,000 cubic yards to the TPIRR borrow quantities and increases earthwork costs by approximately $91.0 million.[61]

As outlined above, TPI made several other input errors from the ICC Engineering Reports for earthwork quantities. Those errors are identified and corrected by CSXT's Engineering Experts in its Reply Workpapers.[62]

The errors found in TPI's ICC Engineering Reports-based quantities input are summarized in Table III-F-10 below:

[61] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xls," Tab "Eng Rep Input," cells M49, M132, M143, M144, and M145.

[62] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Eng Rep Input."

Table III-F-10
TPIRR ICC Engineering Report Input Errors[63]

ICC Engineering Report Item	TPI (Unit)	CSXT Reply (Unit)	Difference (Unit)
Common Excavation	350,649,619	341,374,116	- 9,275,503
Loose Rock Excavation	28,867,210	28,867,946	736
Solid Rock Excavation	65,140,565	65,142,635	2,070
Total Excavation	444,657,394	435,384,697	-9,272,697
Common Embankment	25,190,656	34,555,279	+9,364,623
Train Overhaul >5000, <10000 (CY1000)	92,855,822	92,872,922	17,100
Train Overhaul >10000, <25000 (CY1000)	225,663,890	225,856,840	192,950
Train Overhaul >25000, <55000 (CY1000)	117,545,350	117,545,350	-
Loose Rock Embankment	199,209	677,189	477,980
Borrow	53,604,354	63,460,263	+9,855,909
Total or Rip Rap	1,782,763	1,802,292	19,529
CY of Masonry Total	980,752	981,153	401
Timber (MBM) Total	16,891	16,904	13
Timber Ties (Each) Total	119,244	119,380	136
Piling (LF) Total	1,360,711	1,360,711	-
LF of Pipe Total	3,129,954	3,130,961	1,007

[63] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xls," Tab "Eng Rep Input", Rows 205 to 206.

ii. Other TPIRR Earthwork Quantities and Costs

(a) TPIRR Yards

CSXT accepts TPI's yard earthwork quantities except where TPI failed to include earthwork (as well other road property investments) for the Curtis Bay coal facility, classification yards and for segments with partial CSXT ownership.

(b) Curtis Bay Coal Facility

As explained in Section III-B-3-a, certain shippers included by TPI in its TPIRR traffic group originate and terminate traffic at CSXT's Curtis Bay Coal Trans-Shipment facility in Baltimore, MD. TPI failed to include the costs for replacing this facility on the TPIRR. CSXT has developed costs for the Curtis Bay Coal facility, including the associated coal piers, tracks, conveyors, land and other necessary equipment. Details of the methodology used by CSXT's Engineering Experts to develop costs for this facility are set forth below.[64]

(c) Classification Yards – Hump Yards

TPI failed to account for costs to build embankments required for the "hump" in 12 TPIRR major classification yards, which are easily seen in Google Earth aerial views. CSXT estimates that typical hump dimensions are approximately 1,200 feet in length and approximately eight feet high.[65] CSXT Engineering Experts have estimated the typical hump approach to be approximately 400 feet in length with a two percent grade. The midsection of the

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[64] CSXT also developed TPIRR investment quantities and costs for earthwork, track construction, bridges, and facilities for the Curtis Bay facility, using wherever applicable the same methods, corrections, and adjustments CSXT used elsewhere for those elements. *See* CSXT Reply WP "Curtis Bay Coal Pier.xls."

[65] *See* CSXT Reply WP "CSXT-Existing_Queensgate_Classification_Yard_Hump_3D.pdf." View of Queensgate Classification yard hump from isometric view (three dimensional Terrain Feature) within Google Earth.

hump would consist of a flat- 400 foot segment with a 24 foot wide roadbed and 1.5:1 side slopes consistent with TPI specifications.

The total volume per typical hump is approximately 8,533 CY.[66] The total volume of borrow required to construct humps for the necessary TPIRR facilities is 102,400 CY.[67] CSXT has adjusted TPIRR earthwork quantities and costs to correct TPI's omission.

(d) Segments with Partial CSXT Ownership

As explained in Section III-B-1-c, for several line segments and associated facilities, TPI erroneously assumed the TPIRR would operate trackage rights. Those line segments and facilities actually are properties in which CSXT has an ownership interest. In stepping into the shoes of CSXT, the TPIRR also would take on CSXT's ownership interest, and be responsible for its proportionate share of road property investment costs for those lines. CSXT's Engineering Experts have added earthwork quantities and costs for the line segments identified in Section III-B-1-c.[68]

(e) Total Earthwork Quantities

The following table compares earthwork quantities proposed by TPI and the corrected quantities developed by CSXT in this Reply. Details are set forth in CSXT's workpapers.[69]

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[66] Middle section cross sectional area = [(24' x 8') + (8' x 12'x ½)*2] = 288 SF.

Volume = {
}/27 = 8,533 CY.

[67] 8,533 CY/Yard x 12 Yards = 102,400 CY.

[68] CSXT has similarly added other road property investment quantities and costs where appropriate to reflect the costs the TPIRR would incur for its proportionate share of such partially owned lines and facilities. *See generally,* CSXT Reply WPs "TPIRR Route Miles CSXT Reply.xlsx," "TPIRR Yard Matrix CSXT Reply.xlsx," "Track Construction CSXT Reply.xlsx," "TPI Bridge Construction Costs CSXT Reply.xlsx," "TPI Signals & Communications CSXT Reply.xlsx," and "TPIRR Facilities CSXT Reply.xlsx."

[69] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xls," Tab "EW Cost."

Table III-F-11
Roadbed Preparation Costs

Item	TPI Open (CY)	CSXT Reply (CY)
1 Common Excavation	362,495	362,255
2 Loose Rock Excavation	34,177	34,114
3 Solid Rock Excavation	68,206	68,210
4 Borrow	47,132	53,016

Source: CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx"

(f) Earthwork Unit Costs

CSXT's Engineering Experts have evaluated earthwork unit costs proffered by TPI and made appropriate corrections and adjustments. Revisions to TPI's unit costs are described in the following sections.

(i) Common Excavation

As discussed above, TPI based its unit costs for common excavation on the Trestle Hollow Project. CSXT rejects the notion that common excavation unit cost for the TPIRR would be the same as the single, isolated and atypical 7,000 foot Trestle Hollow project.[70] Instead, CSXT's Engineering Experts have used the common excavation unit cost included by TPI from R.S. Means, which it did not use.[71]

Unlike the unrepresentative unit cost TPI derived from the small, atypical Trestle Hollow Project, R.S. Means costs are developed from real-world costs of a large variety of actual construction projects conducted throughout the country, which provide a far better basis for calculating the costs of constructing the 6,866-mile TPIRR. To develop its annual average costs,

[70] *See* TPI Opening III-F-13.

[71] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xls," Tab "Unit Costs."

R.S. Means contacts manufacturers, dealers, distributors, and contractors all across the U.S. and Canada for input.

R.S. Means' labor costs are based upon the average of wage rates from 30 U.S. cities. Its wage rates are determined from both union labor agreements and open-shop rates. R.S. Means bases its equipment costs on national rental rates and those costs include operating costs such as servicing, fuel, and lubricants. R.S. Means obtains equipment rental rates from contractors, suppliers, dealers, manufacturers, and distributors throughout North America.[72] And R.S. Means has long been accepted by the Board as an authoritative source for railroad construction unit costs. *See, e.g., CP&L,* 7 S.T.B. at 310; *DuPont*, STB Docket No. 42125, at 147; *SunBelt*, STB Docket No. 42130, at 106.

(ii) Adjustment for Adverse Terrain

(1) Adverse Terrain Unit Costs

CSXT rejects TPI's unit cost for common excavation in adverse terrain, which TPI primarily based on the Trestle Hollow Project. Here again, TPI developed a separate unit cost based on R.S. Means data but then did not apply it to earthwork quantities.[73] Instead, TPI calculated a ratio of adverse condition unit costs to common earth unit costs from R.S. Means, and then applied this ratio to the Trestle Hollow common excavation unit cost to generate an artificially depressed adverse conditions unit cost estimate.

As demonstrated, the Trestle Hollow Project unit cost estimates are inapplicable because they were generated in the special conditions of an unusual, unrepresentative project that afforded exceptional economies not attainable elsewhere under more typical, less-optimal conditions. Particularly important here, no part of the Trestle Hollow Project would have

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[72] *See* CSXT Reply WP "Equipment_Selection_Graphics.pdf."

[73] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "Unit Costs," Rows 19 through 28.

qualified as adverse terrain, making it impossible to derive meaningful common excavation costs in adverse terrain from that project. Accordingly, TPI's attempt to manufacture adverse conditions unit costs based upon Trestle Hollow Project costs is illogical and unsupportable.

CSXT's Engineering Experts developed a reasonable unit cost from R.S. Means for common excavation in adverse terrain. In two recent decisions, the Board rejected the complainant's Trestle Hollow-based costs and instead adopted R.S. Means-based costs for common earthwork adverse unit costs. *See SunBelt*, STB Docket No. 42130, at 113; *DuPont*, STB Docket No. 42125, at 149. The unit cost developed by CSXT's Engineering Experts also includes an adjustment to account for different pricing in R.S. Means for material haulage as described below.

(iii) Loose Rock Excavation

CSXT accepts TPI's use of R.S. Means data as the source for loose rock excavation unit costs. As explained below, however TPI failed to adjust the necessary hauling costs match the R.S. Means unit costs with the volume of materials requiring hauling. *See infra* III-F-2-(d)-(iv). CSXT's Engineering Experts included inevitable swell and shrinkage within the TPIRR excavation haul costs.[74]

(iv) Adverse Loose Rock

CSXT rejects TPI's loose rock excavation unit cost for adverse terrain and has instead developed an appropriate unit cost from R.S. Means, incorporating the necessary adjustment to account for the different R.S. Means unit price for hauling materials. TPI failed to adjust the necessary hauling costs match the R.S. Means unit costs with the volume of materials requiring hauling. As explained in more detail below, CSXT's Engineering Experts revised hauling costs

[74] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Unit Costs Modified," Rows 13 through 15.

to account for increased volumes resulting from inevitable expansion materials after excavation. *See infra* III-F-2-(d)-(iv).

CSXT calculated a corresponding R.S. Means-based unit cost of $13.43.[75]

(v) Solid Rock Excavation

CSXT generally accepts the components of TPI's solid rock excavation unit costs and has adjusted TPI's cost of hauling blasted and excavated rock to account for the difference in R.S. Means unit costs for hauled materials. *See infra* III-F-2-c-ii-(g)-(iii) (explaining necessary adjustment). The resulting corrected unit price for solid rock excavation is $19.73 per cubic yard.[76]

(vi) Adverse Solid Rock Excavation

CSXT accepts generally the components of TPI's adverse solid rock excavation unit costs and has adjusted TPI's cost of hauling blasted and excavated rock to account for the difference in R.S. Means unit cost for hauled materials. The resulting unit cost for such adverse solid rock excavation is $19.73 per cubic yard.[77]

(vii) Embankment/Borrow

CSXT accepts TPI's unit cost for borrow.

(g) Other Earthwork Quantities & Unit Costs

CSXT rejects TPI's proposed quantities and unit cost for land for waste excavation, for the reasons explained below. *See infra* III-F-2-d-ii-(d)-i. As further described below, CSXT also

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[75] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Unit Costs Modified," Rows 19 through 21.

[76] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Unit Costs," Rows 26 through 28.

[77] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Unit Costs," Rows 32 through 34.

corrects TPI's failure to include fine grading quantities and costs. *See infra* III-F-2-d-ii-(d)-(ii) through (vi).

(i) Land for Waste Excavation

TPI assumed that the TPIRR would acquire additional land adjacent to its right-of-way to store excavated materials that would not be re-used for fill or embankment. *See* TPI Opening III-F-18. TPI assumed that 30% of the materials excavated during construction of the TPIRR roadbed would not be used as embankment and instead would be "wasted" along the TPIRR right-of-way. *Id.* III-F-2-b-iii-(3). This assumption is consistent with prior Board precedent and is accepted by CSXT.[78] However, CSXT rejects TPI's proffered cost per acre of such land.

To estimate the costs of TPIRR excavation waste dump sites, TPI used an average of its estimated cost of all rural land acquired by the TPIRR of $18,451 per acre.[79] TPI provided no explanation or support for the counter-intuitive notion that land for disposal of excavation waste would be necessary only in rural areas. In fact, as TPI explained elsewhere in its opening evidence, 31% of the TPIRR right-of-way traverses high value residential, industrial, or commercial areas.[80] In other words, by TPI's own count, almost one third of the TPIRR route is in non-rural areas. If TPI were to limit its disposal land acquisition to rural locations, it would be required to adjust the TPIRR earthwork excavation costs to account for substantially longer haul distances required to transport excavated materials from urban (including residential, industrial, and commercial) areas (such as Chicago, IL and Washington, DC) to the rural waste areas. TPI

[78] *See AEP Texas II,* STB Docket No. 41191 (Sub-No. 1), at 86.

[79] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "Other Costs," cell G86.

[80] TPI Opening Table III-F-3 shows the TPIRR distribution of land use as 14% residential, 14% industrial and 3 percent commercial, or a total of 31%.

made no such adjustment. Therefore, TPI's assumption that land for waste would be located only in rural areas is unsupported and infeasible.

Further, because TPI specified a narrow 75' urban right-of-way ("ROW") along 31% of the 6,866 mile long TPIRR route, TPI would have relatively little space to construct its roadbed. The parties agree that earthwork quantities for SARRs are derived from ICC Engineering Reports quantifying predecessor railroads. Since the early 1800s, engineers designing railroads have strived to construct projects in the least-costly and most efficient manner. The notion, expressed by complainants in recent cases, that unexplained and unsupported efficiencies of construction would enable a SARR to dispose of waste material exclusively on rural land, without substantially increased hauling distances, is baseless. For example, if waste from TPIRR grading segment 84 within the Washington, DC metro area (an urban segment) which produced 312,456 CY of waste based on the ICC quantities, is not hauled off site, and design standards were not lowered (profiles, drainage, etc.), there would be only two plausible alternatives to dispose of the resulting waste material: 1) embankments could be widened and additional ROW acquired to accommodate excess material or 2) the SARR could construct retaining walls to accommodate excess material as fill within the urban ROW. But, TPI did not include costs for additional wall construction or for acquiring additional ROW to accommodate wider embankment in urban areas.[81] As a result, waste sites adjacent to urban segments of the TPIRR would be inevitable.

CSXT's Engineering Experts analyzed the excavation specified in TPI's subgrade preparation work sheet to determine how much of the material waste would occur in urban areas

[81] Because such urban areas are far larger than the hauling distances posited by TPI, it would not be possible to transport waste material from urban areas to rural areas without very significantly increasing hauling distances and associated costs.

and how much would occur in rural grading segments. Grading segments along the TPIRR were divided into rural and urban categories using the land type designation specified by TPI's real estate appraisers. Contrary to TPI's assertion that there would be minimal excavation within urban areas (*see* TPI Opening III-F-18), CSXT's Engineering Experts found that, in total, TPIRR would require approximately 46,000,000 CY of excavation in urban areas.[82] Those Experts calculated the area of land needed to waste 30% of the excavated material within urban areas following TPI's methodology in its "Open Grading.xls," Tab "Other Costs", Rows 80 through 85 with modifications. CSXT estimated the cost of purchasing the required land for waste within urban and rural areas using the following method[83]:

1) Grading segments were sorted by land type (urban or rural);[84]

2) CSXT's Engineering Experts calculated 30% of excavation material per segment;

3) CSXT applied a 20% swell factor to the quantity to determine appropriate acreage requirements;[85]

4) CSXT calculated land for waste needed per grading segment, using TPI's specified waste pit design (24,200 CY of waste per acre with 1.69 markup);[86] and

5) Cost for land needed to waste material within each grading segment was developed by multiplying land for waste pits by the average cost of land ($/acre) for urban and rural area.

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[82] *See DuPont*, STB Docket No. 42125 at 169-170, *SunBelt,* STB Docket No. 42130 at 119, and CSXT Reply WP "TPIRR Open Grading_Urban.xlsx," Tab "Other Costs," cell G78.

[83] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Other Costs," Rows 88 through 106.

[84] *See* CSXT Reply WP "TPIRR Open Grading_Urban.xlsx" Tab "EW Costs," and CSXT Reply WP " TPIRR Open Grading_Non_Urban.xlsx" Tab "EW Costs."

[85] *See* CSXT Reply WP "TPIRR Open Grading Urban.xlsx," Tab "EW Costs," and CSXT Reply WP "TPIRR Open Grading_Non_Urban.xlsx," Tab "EW Costs."

[86] *See* TPI Op. WP "Land for waste quantities.pdf" and TPI Op. WP "Open Grading.xlsx," Tab "Other Costs," Line 84.

After correction, the revised total cost for land for excavation waste developed by CSX's Engineering Experts is approximately $510 million, instead of TPI's opening estimate of $216 million.[87]

(ii) Fine Grading

Fine grading is the final shaping of the constructed roadbed in order to establish the cross sections and profile of the engineering design. CSXT's Engineering Experts explain that fine grading is not included in general grading costs because fine grading requires different equipment. R.S. Means excavation and borrow unit costs assume the use of scrapers and bulldozers to achieve a rough grade. But fine grading requires the use of motorgraders to achieve a more precise final grade.[88] The Board has held that fine grading requires specialized equipment that is not accounted for in the R.S. Means excavation and borrow costs. *See Otter Tail,* STB Docket No. 42071, at D-14. Indeed, the Board recognized R.S. Means lists fine grading separately. *Id.* at D-14; R.S. Means at 31-22-16.10-0200 Finish Grading-Grade subgrade for base course, roadways.[89] Moreover, the Board has concluded that fine grading was "an actual and necessary construction element for rail lines" in part because R.S. Means lists fine grading as a separate activity from general grading. *See Xcel,* 7 S.T.B. at 678.

Twice in recent months, the Board has rejected the identical assertion that the cost for fine grading operations would be included in other costs accounted for in the Trestle Hollow project. At the same time, the Board reaffirmed its conclusion from *Xcel,* "Means lists fine grading separately from other grading activities, and this additional step would be needed to

[87] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Other Costs."

[88] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Unit Costs" and "RSMeans_Scraper&Bulldozer_Crews.pdf" and "Motor grader pictures.pdf" and "RSMeans_Fine_Grading_B-11L_Crew.pdf."

[89] *See* CSXT Reply WP "RSMeans_Fine_Grading_Item.pdf."

shape the DRR's roadbed." *See id., DuPont*, STB Docket No. 42125, at 172; *SunBelt,* STB Docket No. 42130, at 115-16 ("Means lists fine grading separately from other grading activities, and this additional step would be needed to shape the SBRR's roadbed.").

Scrapers and bulldozers used to shape the roadbed section roughly are not capable of the finer tasks of creating the crown of the roadbed or the shape of the ditches. Because of this limitation on the use of scrapers and bulldozers to achieve the final shape and form of the roadbed, railroad contractors use motor-graders to provide the final shape and smoothness desired on the crown of the roadbed during the final compaction process. Motor-graders operated by experienced personnel are capable of obtaining final subgrade elevations within one inch.[90] Failure to achieve a smooth compacted subgrade at the designed elevation would require major overruns of sub-ballast quantities (and attendant costs) in order to achieve a uniform aggregate base thickness. CSXT has provided similar workpapers that the Board found to be sufficient to prove the need for fine grading in *Otter Tail, DuPont*, and *SunBelt.*[91] CSXT's Engineering Experts calculated an appropriate unit cost for fine grading using R.S. Means, which is consistent with the cases referenced above.[92]

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[90] *See* CSXT Reply WP "CSXT Reply Fine Grading_2.pdf."

[91] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xls," Tab "Finish Grading."

[92] TPI contends that the Trestle Hollow Project finish grading cost is included in its earthwork unit cost. *See* TPI Opening III-F-15. However, the Trestle Hollow Project documents are for a lump sum bid, and do not show whether fine grading was included in the earthwork costs for the project. Moreover, as CSXT previously demonstrated, the small, atypical Trestle Hollow Project is not representative and is not a reasonable or reliable basis for extrapolating costs necessary to construct a 6,866-plus route mile rail network such as the TPIRR. *See supra* III-F-2 to III-F-2-a. Although CSXT acknowledges that some construction project bids sometimes do include fine grading costs with earthwork, R.S. Means uses a separate cost line item to develop the earthwork unit cost. TPI did not include a separate cost for finish grading. CSXT's Engineering Experts determined the quantity of fine grading needed by applying TPI's specifications for the dimensions and parameters of single, double, triple, and quadruple -track roadbed. CSXT used the total length of the four different roadbed cross sections (single, double, triple, and quadruple) and TPI's specified roadbed widths to calculate total area estimated for fine grading (Example:

(iii) Adjustment to Material Haulage Quantities to Match R.S. Means Reported Costs

TPI failed to consider in the development of its excavation unit prices that materials expand when excavated from their natural state. According to Ringwald's Means Heavy Construction Handbook – R.S. Means:

> There are three soil states involved in the process of excavating, hauling and backfilling earth: bank [BCY], loose [LCY], and compacted [CCY or embanked ECY]. Bank earth is undisturbed soil, and is of medium density relative to the other states. Loose earth is that which lies in the hauling vehicle or in an unconsolidated lift on the embankment. It is the least dense of the states. After consolidation, the lift is in the compacted, most dense state. (An exception is solid rock which—after moving—can never be compacted as tightly as it exists in the bank [natural] state).[93]

R.S. Means recognizes the need for such a distinction by reporting its unit prices for hauling excavated materials in Loose Cubic Yards ("LCY") which is defined generally as soil in an uncompacted state, either in a heap on the ground or in the bed of a hauling vehicle.[94] For compaction operations, R.S. Means reports the unit prices in Embanked (compacted) Cubic Yards (ECY). R.S. Means explains in its "Site Preparation" section the need to convert units costs (*i.e.,* \$/Bank Cubic Yard ("BCY"), \$/LCY, or \$/ECY) to match reported quantities to account for differences in material volumes due to swell and shrinkage.[95]

1000 ft of single track roadbed at 24 ft width = 1,000 ft, 1,000ft x 24 ft = 24,000 sq ft of roadbed to be fine graded). CSXT's Engineering Experts used a unit cost from R.S. Means, \$0.46 per square yard to estimate total cost of finish grading the TPIRR. The total cost of finish grading the TPIRR is approximately \$96 million. *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xls," Tab "Finish Grading."

[93] *See* CSXT Reply WP "Swell and Shrinkage - Ringwald, Means heavy Construction Handbook.pdf."

[94] *See* CSXT Reply WP "Swell and Shrinkage - Ringwald, Means heavy Construction Handbook.pdf."

[95] *See* CSXT Reply WP "RSMeans Site Prep Worksheet - swell and shrinkage factor.pdf."

In its *SunBelt* decision, the Board concluded that ICC Engineering Report quantities "address earthwork in its post-construction state," *i.e.,* its final or compacted/embanked state (ECY).[96] As explained above, the ECY state is the most compacted or most dense soil state. According to both Ringwald's Means Handbook and R.S. Means, hauler unit costs, which are reported as the least dense LCY, should be converted to the volume corresponding to the units in which the earthwork quantities are reported. To make this necessary adjustment (from ECY used by the Engineering Reports to LCY in which those materials are hauled), CSXT's Engineering Experts used standard soil volume conversion factors used to convert compacted/embanked volumes (ECY) to hauled volumes (LCY) as derived from Ringwald's "Means Heavy Construction Handbook"[97]:

Table III-F-12

	Common		
ECY	To	LCY	1.39
	Loose Rock		
ECY	to	LCY	1.27
	Solid Rock		
ECY	to	LCY	1.15

CSXT's Engineering Experts used the R.S. Means Site Preparation section as a guide to matching units to reported quantities, where it provides an instructive example of how to account for its differences in reported prices. Specifically, R.S. Means shows that its excavation unit costs are in BCY, and that the cost per unit for a 22 CY hauler are reported as LCY. The density

[96] *See SunBelt*, STB Docket No. 42130, at 116.

[97] *See* CSXT Reply WP "Swell and Shrinkage — Ringwald, Means heavy Construction Handbook.pdf."

difference for two types of materials is 27% for loose rock quantities (using a 1.27 swell factor). In its example, R.S. Means increases the amount of material to be hauled to account for the differences in unit prices. Swell and shrinkage factors are also explained within the R.S. Means text Building Sitework—Site Preparation section, which illustrates how to construct a cost per Cubic Yard of material from equipment and labor per pay item.[98] CSXT's Engineering Experts prepared an illustrative calculation that is included in workpaper "CSXT Shrink and Swell.pdf."

By neglecting to account properly for the R.S. Means difference in unit prices, TPI significantly understated the cost of haulage of materials excavated in the construction for the TPIRR.[99] CSXT has corrected this error by modifying TPI's proffered excavation haulage unit costs to account for the necessary conversion from ECY to LCY.[100]

(h) Subgrade Preparation (moisture conditioning)

CSXT rejects TPI's failure to include costs for subgrade preparation, which includes water for compaction and drying of wet material where necessary, based on soil conditions. In some prior coal rate cases, the Board excluded water for compaction costs because the proponent failed to provide evidence demonstrating the need for water for compaction. *See, e.g., CP&L,* 7 S.T.B. at 317; *Duke/NS,* 7 S.T.B. at 179-180. However, the Board accepted water for compaction in *TMPA,* where the defendant provided USDA Ecosystem Domain maps. *TMPA I,* 6 S.T.B. at 707. More recently, the Board accepted the defendant carrier's evidence regarding

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[98] *See* CSXT Reply WP "RSMeans Site Prep Worksheet — swell and shrinkage factor.pdf."

[99] As noted above, the effects of swell are accounted for in CSX's calculation of unit costs for the affected activities (including loose rock excavation, adverse loose rock, and solid rock excavation). *See supra* III-F-2-c-ii.

[100] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply," Tab "Unit Costs Modified," Columns E to P.

water for compaction in both *DuPont* and *SunBelt*. *See DuPont,* STB Docket No. 42125, at 183; *SunBelt,* STB Docket No. 42130, at 113.

As the Board effectively recognized in *SunBelt* and *DuPont,* there is little debate that water for compaction is widely used in transportation construction projects. Although it is not reported as a separate item in the Engineering Reports, water for compaction likely was used in the construction of the original CSXT roadbed.[101] Further, construction practices that are employed today are not considered barriers to entry—even if they were not used in the original construction. *See, e.g., CP&L,* 7 S.T.B. at 318 (silt fences are "modern construction technique" and not a barrier to entry). Prior to the Board's recent decisions in *DuPont* and *SunBelt,* there had been a general assumption in prior proceedings involving Eastern carriers that the East has sufficient water content and that no soil preparation is required.[102] As the Board implicitly recognized in adopting subgrade preparation costs in *SunBelt* and *DuPont,* this was a simplistic over-generalization that is inconsistent with real-world construction experience. It is particularly inappropriate with respect to a SARR traversing nearly 6,866 miles of diverse soils and geography. Soil moisture content varies widely, both with the geographic area and type of soil, and with the season. TPI offered no evidence to support its blanket assumption that subgrade preparation using water for compaction or additional drying of moist soil would not be needed in any area or any season during construction of the TPIRR.

TPI's only attempt to justify its faulty assumption is a document reporting historical average rainfall data for several locations along the TPIRR from an amateur historical weather website called *World Climate*.[103] This site clearly states in a disclaimer that:

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[101] *See, e.g.,* CSXT Reply WP "Wisconsin Transportation Bulletin – Compaction.pdf."

[102] *Duke/NS,* 7 S.T.B. at 179-180.

[103] *See,* WorldClimate, http://www.worldclimate.com (last visited July 15, 2014).

> "The data on worldclimate.com comes from a wide range of public domain sources and has been further processed by worldclimate.com. As with any data gathered and processed over many years in many places, IT PROBABLY CONTAINS ERRORS.
>
> DO NOT RELY ON THIS DATA FOR ANY PROFESSIONAL OR IMPORTANT PURPOSE, INCLUDING BUT NOT LIMITED TO AGRICULTURE, ENERGY PLANNING, VACATION PLANNING, FLYING, BOATING, OR ACADEMIC RESEARCH." [104]

The information used to compile this table of "average rainfall" at several points along the TPIRR route from *World Climate* does not even provide weather data from the same *decade* as the TPIRR construction schedule. In fact, the most recent data TPI cites to "justify" its assumption that the soil encountered along the TPIRR, throughout 17 states, would not need any moisture adjustment during construction, is from 1995. Other weather data TPI relies on dates back nearly four decades from the TPIRR construction period to 1972 (rainfall data from Noble County, IN used by TPI does not include precipitation data after 1972).[105] TPI thus assumes the moisture content of soils encountered during construction of nearly 7,000 route-miles of railroad based on limited, outdated, and very imprecise rainfall data reported in an amateur website that expressly warns the viewer not to rely on that data.

In the experience and opinion of CSXT's Engineering Experts, any large-scale construction project conducted across the variety of soils and conditions that the TPIRR would encounter would require some subgrade preparation to facilitate compaction of soil. Soil compaction increases the strength of the soil, which increases the load-bearing capacity of the soil and the stability of embankment slopes. It also reduces the potential for destructive volume

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[104] *See,* WorldClimate, "WorldClimate Disclaimer," http://www.worldclimate.com/disclaim.htm (last visited July 15, 2014): CSXT Reply WP "CSXT_REPLY_Worldclimate.com_Disclaimer.pdf."

[105] *See, e.g.,* TPI Op. WP "TPIRR Route avg rainfall.pdf."

change that could occur from soil settlement, swelling due to moisture content changes, and frost heave.

Factors that affect soil compaction include soil type, particle size, compaction effort, and moisture content.[106] Moisture content plays a very important role in obtaining an optimum compaction level. The amount of water in the soil determines the spacing of soil particles relative to one another. Every soil has an optimum moisture content ("OMC") at which it is possible to obtain the maximum density.[107] Compaction is measured in terms of a soil's dry unit weight in pounds per cubic foot, and its moisture content. In turn, moisture content is defined as the weight of water in the soil divided by the weight of the dry soil in a given volume of soil.[108] A typical compaction curve shows that the dry unit weight increases up to the OMC and then decreases as the moisture content increases. The dry density corresponding to the OMC is called the maximum dry density. As water content increases before reaching OMC, the water allows the soil particles to come closer together increasing density above that of dry density. As water content increases after reaching OMC the excess water separates the soil particles decreasing the density.[109]

Project specifications for railroad embankment construction typically require soil to be compacted to at least 95% of the maximum dry density.[110] To achieve this level of compaction,

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[106] *See generally* CSXT Reply WP "Soil Moisture for Compaction.pdf" (excerpts from leading construction methods text explain role of soil moisture in compaction and need to add moisture in some areas and remove moisture in others).

[107] *See id.*

[108] *Id.*

[109] *See id.*

[110] *See* CSXT Reply WP "CSXT Grading Spec.pdf."

the soil should have a moisture content in a range of +/- 1% to 4% of the optimum level.[111] If the soil that is placed as fill does not have a natural moisture content within this range, the recommended minimum of 95% compaction cannot be achieved without moisture conditioning. Thus, for soils having either <u>more or less</u> moisture content outside a narrow range around the optimum, use of the soil as fill requires moisture conditioning.

Moisture conditioning entails adding water to the soil if it is too dry for compaction, or drying the soil if it is too wet. Chemical additives can also be used to dry soil with excessive moisture content, but that process is more expensive because it requires expenditures for materials in addition to mechanical mixing and distribution. The use of such a chemical additive process to reduce soil moisture content would add significant costs over and above the costs of the mechanical drying methods proposed by CSXT's Engineering Experts.[112]

Adding water to low-moisture content soil involves use of a water truck to spray the soil to be compacted, then compacting that soil. For fine-grained clays and silts that do not readily absorb water, the water must be mixed into the soil before compacting. In addition to the need to add water to dry soils, attaining optimal moisture content to ensure proper compaction requires drying of higher moisture soils through either the addition of dry soil or aeration.[113] In its two most recent decisions, the Board accepted moisture conditioning costs, including both water for compaction and drying of wet soils, proposed by the defendant carrier. *See DuPont,* STB Docket No. 42125, at 183 ("Because the Board is rejecting the inclusion of costs developed from the Trestle Hollow Project, and DuPont did not calculate costs for subgrade preparation and water

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[111] *See* CSXT Reply WP "CSXT Reply WP Compaction Standard Compaction Curve.pdf."

[112] CSX's Engineering Experts developed their subgrade preparation estimates based on the assumption that the builders of the TPIRR would use only mechanical drying methods, including disking. *See* CSXT Reply WP "Equipment Selection-Drying of soil for Compaction.xlsx."

[113] *See* CSXT Reply WP "Wisconsin Transportation Bulletin — Compaction.pdf."

for compaction, the Board will accept the costs developed by NS"); *SunBelt,* STB Docket No. 42130, at 113 (same). CSXT's Engineering Experts used a method very similar to the method the same experts used in *DuPont* and *SunBelt* (with additional refinements in this case) to determine quantities of soil on the TPIRR route that would require water for compaction or drying and corresponding investment costs. That methodology is described below.

CSXT's Engineering Experts studied the soil conditions in five States traversed by the TPIRR, (whose route traverses 17 states covering multiple physiographic areas and conditions). CSXT's Engineering Experts began their soil moisture analysis with the three-tiered physiographic classification of the United States by division, province, and section based on geologic history, rock type, and structure in combination with terrain developed by Nevin Fenneman. Under Fenneman's typology, Physiographic Divisions in the United States consist of several Provinces, each of which in turn consists of several Sections.

CSXT's Engineering Experts mapped the physiography traversed by the TPIRR track route by overlaying the track route onto published USGS physiographic mapping using geographic information system ("GIS") shape files.[114] This mapping is necessarily generalized due to the large geographic area and limited scale and resolution of available data.[115] Each of the Physiographic Divisions covers large regions of the country. Each of the Divisions is subdivided into smaller Physiographic Provinces and further subdivided into smaller Sections. Based on published mapping, the TPIRR track route traverses portions of three Physiographic Divisions, nine Provinces, and 29 Sections.

To catalog the TPIRR soil moisture conditions on a state by state basis, CSXT's Engineering Experts have accessed the Digital General Soil Map of the United States or

[114] *See* CSXT Reply WP Folder "USGS GIS TPIRR"

[115] *See* CSXT Reply WP "TPIRR_Physiographic_Geo_map.pdf."

STATGO2. The Digital General Soil Map was developed in the last few years by the US Department of Agriculture, Natural Resources Conservation Services ("NRCS") through the National Cooperative Soil Survey partnership of Federal, State, regional and local agencies. The geo-referenced data set was created by generalizing from more detailed county soil survey maps to a State-level scale map.

CSXT's Engineering Experts selected the States of Illinois, Indiana, Ohio, Pennsylvania and New York to obtain detailed soil moisture data. These States have lower annual precipitation compared to other States on the TPIRR route. CSXT's Experts overlaid the Digital General Soil Map of these states with the corresponding TPIRR route to determine the Soil Map Units traversed by each segment of the TPIRR route. Selected properties of each Soil Map Unit, including gradation, plasticity and two types of moisture content were obtained for each Soil Map Unit traversed by the TPIRR route.

Two water content values are given in the STATGO2 data base. These values represent a dry condition (15-bar) and a wet condition (1/3-bar).[116] NRCS water content data are determined using different test methods than the water content used for soil compaction evaluation. In the opinion of CSXT's Engineering Experts, the NRCS data provides a reasonable representation of the natural moisture content for preliminary analysis.

[116] Free water or gravitational water will drain from a soil until the soil water potential reaches -1/3 bar (a bar is a unit of pressure equivalent to a column of 33.4 feet of water pressure). This is called field capacity. Gravitational water is not considered available to plants because it is in the soil only a short time and reduces oxygen levels to the point where the plant will not be absorbing water anyway. As the soil continues to dry—or water is used by plants—more and more energy is needed by the plants to remove the water. Eventually a point is reached where the plant can no longer remove water. This is called the wilt point and occurs at -15 bars water potential for most plants. From -1/3 to -15 bars is the zone of available water. *See* http://www.swac.umn.edu/classes/soil2125/doc/s7chp3.htm.

CSXT's Engineers next developed a Table showing the natural moisture content ("NMC") calculated from the NRCS data.[117] Estimated maximum dry densities and OMC values for the Soil Map Units intersected by the TPIRR route in each state are also shown in the workpaper. These values were taken from correlations in Table 35.10 of the Civil Engineering Reference Manual by M.R. Lindeburg, 12th ed., 2011. The difference between the OMC and the NMC indicates whether the soil may be dryer or wetter than optimal. If the soil is shown to be dryer than optimum, the added quantity of water required to achieve 95% compaction is calculated and shown in the right-most column.

CSXT then analyzed the soil moisture content along the TPIRR route based on a ".kmz file" used by the CSXT real estate group.[118] Using the real estate file and soil data, the analysis yielded detailed moisture content readings for each of the .kmz segments making up the CXST TPIRR Google Earth model. CSXT's Engineering Experts were then able to calculate the total length of TPIRR route requiring water or drying for optimum compaction for each state analyzed. Those Experts then divided the total length of TPIRR route requiring water or drying for compaction, by the total TPIRR route length per state to develop a percentage of TPIRR route requiring water or drying. [119]

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[117] *See* CSXT Reply WP Folder "Soil Moisture Content."

[118] ".kmz files" are compressed Keyhole Markup Zipped computer files used to store and maintain detailed geographic data and information developed by Google Earth. *See* CSXT Reply WP Folder "TPIRR GIS," in III-F-2/Soil Moisture Content.

[119] Example: There is a total of approximately 3,948,000 route feet of TPIRR running through Indiana. According the soil moisture analysis, approximately 216,500 route feet would require water (or 5.5%) and approximately 3,520,000 route feet would require drying (or 89.2%). The remaining 211,700 route feet were found to be at optimum moisture content requiring no water or drying. *See* CSXT Reply WP "STATSGO2_GIS_Soils_TPIRR with Water Content.xlsx," Tab "IN."

CSXT's Engineering Experts used the percentage of soil requiring water and drying per state to estimate the volume of excavation requiring water and drying along the TPIRR in the states analyzed.[120] Based on the foregoing analysis, CSXT's Engineering Experts derived the following estimates of TPIRR soils requiring such subgrade preparation.

Soils needing added water for compaction. Approximately five percent of the excavation, or 23.4 million CY along the TPIRR would require water for optimum compaction.[121]

Soils Requiring Drying. CSXT's Engineering Experts determined that approximately 27%, or 123.6 million CY, of the total TPIRR excavation would require drying for optimum compaction.[122]

To dry soil after it is excavated; it must be spread and scarified by disking or blading. Repeated disking or blading cycles are required until sufficient water evaporates for the soil to approach optimum moisture conditions. Drying soil often is costly due to the large areas needed to spread the soil, the need for suitable weather conditions in which to conduct the drying, and potential construction delays while waiting for the soil to dry.

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[120] Example: There is a total of approximately 143,400 CY of excavation in grading segment 3, "IL/IN Line to Pine Jct." in Indiana. CSXT multiplied the percent of soil in Indiana requiring water and drying to total excavation in grading segment to estimate: total excavation requiring water (143,400 CY x 5.5% = 7,900 CY) and drying (143,400 CY x 89.2% = 127,900 CY) per segment. *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "EW Cost," Line 16.

[121] CSXT's Engineering Experts derived percent of excavation requiring water derived from total percent of soil above optimum moisture content level (OMC) within each state. *See* CSXT Reply WPs" STATSGO2_GIS_Soils_TPIRR with Water Content.xlsx" and "TPIRR Open Grading CSXT Reply.xlsx," Tab "EW Costs."

[122] Percent of excavation requiring drying derived from total percent of soil below optimum moisture content level (OMC) within each state. *See* CSXT Reply WP "STATSGO2_GIS_Soils_TPIRR with Water Content.xlsx" and "TPIRR Open Grading CSXT Reply.xlsx," Tab "EW Costs."

As discussed above, TPI's evidence did not account for either drying soil that has a higher moisture content than needed for compaction or applying water to soil that has a lower moisture content than that needed for compaction. TPI based its position on the atypical "Goldilocks" experience of the Trestle Hollow Project where the soil boring reports indicate the existing soil had the optimum moisture content needed for compaction. It is wholly unrealistic to assume—contrary to the evidence, the real-world experience of CSXT's Engineering Experts, and *SunBelt* and *DuPont*—that the moisture content of all of the soil over nearly 7,000 route miles would be "just right" like the short Trestle Hollow project, which is not even on lines replicated by the TPIRR.[123] *See SunBelt*, STB Docket No. 42130, at 113; *DuPont*, STB Docket No. 42125, at 183.

The R.S. Means watering cost includes the cost of loading, transporting, and distributing the water in the roadbed material. The cost of watering soil to achieve optimum compaction derived from R.S. Means used by CSXT is $2.12 per CY of excavation. CSXT's Engineering Experts applied this cost to common excavation and borrow quantities requiring water for compaction to calculate TPIRR cost for that work.[124]

TPI similarly failed to apply a cost for drying wet material. For soil with a moisture content too high for proper compaction, CSXT's Engineering Experts have developed a soil drying unit cost from R.S. Means cost data. CSXT used the B-84 Crew an operator and a tractor (same crew used for clearing) and added a Disc Harrow Attachment for a total cost of $890 per day.[125] CSXT assumed a production rate of 4,000 CY/ day, which is the production rate of 8

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[123] *See supra* III-F-2-a for CSXT's discussion of reasons the Trestle Hollow costs are inapplicable to this case.

[124] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Unit Costs", Line 170.

[125] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Unit Costs", Line 174.

scrapers (530 CY/day each) with a reasonable grading crew size. This generates a unit cost of $0.22 / CY. CSXT applied this cost to Common Excavation and borrow quantities for the areas with soil that the CSXT Engineering Experts determined is too wet.[126]

(i) Total Earthwork Cost

The corrections and adjustments described above increase the costs associated with total earthwork, (including additional land purchases), for the TPIRR to a corrected total of $4.67 billion, an increase of more than 1.74 billion over the costs posited by TPI.[127]

d. Drainage

i. Lateral Drainage

CSXT accepts TPI's use of the ICC Engineering Reports to quantify lateral drainage needed for the TPIRR route and its proposed unit costs. CSXT rejects TPI's quantities of lateral drainage because TPI erroneously excluded certain lateral drainage pipe quantities from the ICC Engineering Reports.[128] CSXT has corrected this error by adding these pipe quantities to the lateral drainage totals.[129]

ii. Yard Drainage

CSXT accepts TPI's yard drainage quantities and costs except for drainage quantities and costs needed for the Curtis Bay Coal Facility, which TPI omitted from its SAC evidence.

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[126] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "EW Cost;" CSXT Reply WP "Equipment Selection Drying of soil for Compaction.xlsx."

[127] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Summary."

[128] *See* TPI Op. WP "TPIRR Open Grading.xlsx," Tab "Eng Rep_Inputs."

[129] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tabs "ICC Eng Input" & "Other Items."

e. Culverts

CSXT rejects TPI's proffered culvert unit costs and quantities. Specifically, CSXT rejects TPI's calculation of excavation, bedding, and backfill quantities.

TPI attempted to calculate volume required to excavate culvert trenches in its workpapers, but failed to account for the total excavation needed for locations with multiple culvert barrels. TPI specified in its workpapers that trenches must be wide enough to accommodate space between culverts ranging from one foot to three feet depending on culvert diameter.[130] TPI failed, however, to include those additional spaces in its quantity calculations for excavation, bedding, and backfill.

i. Culvert Unit Costs

CSXT rejects TPI's culvert unit cost estimates because they either omitted (in some instances) or incorrectly applied (in others) costs associated with the installation of culverts. TPI also made several computation errors in its workpapers.

CSXT rejects TPI's unit cost for bedding material. Here again, TPI used a unit cost from the inapposite Trestle Hollow Project. As demonstrated, unit costs from the Trestle Hollow Project are not representative of the costs the TPIRR would incur. *See supra* III-F-2-a. Therefore, CSXT's Engineering Experts applied the R.S. Means unit cost of $38.50 /CY for bedding material, increasing the total cost of bedding to approximately $23.7 million.[131]

CSXT rejects the R.S. Means unit costs for excavation that TPI used in its Opening Evidence. TPI erroneously used a unit cost for trenching up to four feet of width to estimate cost for trenching ditches required for TPIRR culverts from 24" to 120" (2 ft – 10 ft). CSXT's Engineering Experts used unit costs for trenching both four- to-six foot wide trenches and six-to-

[130] *See* TPI Op. WP "TPIRR Culvert Construction.xlsx," Tab "Unit Cost," cells K23-31.

[131] CSXT Reply WP "RSMEANS CSXT Bedding Unit Price.pdf."

ten foot wide trenches to accommodate larger culverts.[132] This correction increased total cost of excavation for culverts increased to approximately $12 million.

ii. Culvert Installation Plans

TPI incorrectly calculated culvert installation quantities by failing to account for the space between multiple barrels per its culvert specifications (such space is also necessary to allow efficient operation compaction equipment). TPI specified "Distance Between Multiple Barrels (Ft)" in Column KL in its workpaper "TPIRR Culvert Construction.xls" but failed to calculate excavation, bedding, and backfill quantities to account for the additional space between culverts.

CSXT applied the recommended minimum spacing between pipes on multiple barrels with different sizes of culvert pipe from the National Corrugated Steel Pipe Association Installation Manual, which is a specification from the culvert supplier Contech that TPI apparently used as design guide.[133]

In accordance with those specifications, the culvert trench on multiple barrels would be excavated with dimensions one foot offset from the side of culverts plus the minimum spacing between the culverts plus culvert widths, a foot below the flow line of the culvert, and a foot above the top of the pipe for cover. CSXT's Reply Evidence corrects the trench excavation, bedding, and backfill quantities to reflect the correct trench dimensions.[134]

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[132] CSXT Reply WP "CSXT Reply RS Means Trenching unit cost.pdf."

[133] CSXT Reply WP "NCSPA Installation Manual.pdf."

[134] *See* CSXT Reply WPs "Culvert Pipe Trench by CSXT.pdf and "Multi Barrels Min Spacing By CSXT.pdf."

iii. Culvert Quantities

CSXT's Engineering Experts accept the majority of TPI's proposed culvert corrugated metal pipe ("CMP") quantities but reject the substitution of some existing bridges to culverts. CSXT rejects these culverts due to the infeasibility of replacing the existing structures with CMP culverts. Installing culverts at these few locations would either restrict existing roadway traffic or provide inadequate capacity. *See infra* III-F-5-b-ix (explaining reasons that, in some instances, culverts could not be substituted for bridges as proposed by TPI). CSXT removed costs for these culverts and accounted for the cost of constructing structures in the bridge estimate.

iv. Total Culvert Costs

Based on the foregoing, CSXT has determined the corrected cost of TPIRR culverts to be approximately $137 million, rather than the $124 million calculated by TPI.

f. Other

i. Side-slopes

CSXT accepts TPI's average side-slope ratio of 1.5:1.

ii. Ditches

CSXT accepts TPI's specifications of side ditches having trapezoidal sections with cuts two feet wide and two feet deep for all locations.

iii. Retaining Walls

CSXT rejects TPI's proposed retaining wall quantities. TPI used the ICC Engineering Reports to derive retaining wall quantities. The ICC Engineering Reports include cubic yards of masonry, timber walls, and walls made from timber ties and pilings under the category "Protection of Roadway" included in Account 3, Grading. TPI stated in its opening evidence that rather than construct the masonry, tie, or timber retaining walls documented in the ICC

Engineering Reports, the TPIRR would use gabions (galvanized steel mesh boxes filled with rock) to replace the masonry, timber, and tie retaining walls, but that the TPIRR would use the same piling retaining walls reported in the ICC Engineering Reports.[135]

CSXT accepts TPI's timber-and- tie-to-gabion quantities conversion and replacement in kind of piling retaining walls. CSXT also accepts the use of gabions as replacements for masonry, timber, and tie retaining walls, but rejects TPI's conversion of masonry to gabion quantities determined by TPI. As demonstrated below, TPI's approach erroneously replaced cubic yards of masonry wall with equal cubic yards of gabion wall.

(a) Retaining Walls Replaced With Gabions

As explained below, TPI made substantial errors in determining TPIRR gabion wall quantities and costs by using erroneous assumptions to convert masonry retaining wall quantities into comparable gabion quantities.

Conversion of Masonry and Timber Retaining Wall Quantities to Gabions

TPI failed to account properly for the difference in weight between masonry retaining walls and gabions, and thereby underestimated necessary gabion quantities. The Board has previously addressed this same issue and found that a proper quantity conversion must be used when replacing masonry walls with gabion walls. *See DuPont*, STB Docket No. 42125, at 178 ("With respect to quantities, the Board will accept [defendant's] correct quantities for replacement of masonry walls with gabion walls because [defendant] developed quantities using the proper conversion ratio of 1:1.54"); *SunBelt*, STB Docket No. 42130, at 123 (same).

[135] *See* TPI Opening at III-F-23; CSXT Reply WP "Retaining Wall Description.pdf." (Describing gabions, their characteristics, and functions). For further description of gabions, *see* CSXT Reply WP "Tenn DOT RetainMan.pdf."

Masonry walls, timber walls, tie walls, and gabion walls are gravity structures, meaning that their weight is used to resist sliding, overturning, shear, and other movement due to lateral forces exerted by the soil. In order to resist the same amount of force, a gabion wall must have the same weight as a masonry wall.[136] However, masonry walls are more dense (have a greater weight to volume ratio) than gabions, which are filled with loose rock and have a significant volume of void space (and thus are much less dense). Therefore, it was erroneous for TPI to assume that a given volume of masonry wall could be replaced by the same volume of gabions, because the critical factor for such gravity structures is weight.[137] Replacement of a section of masonry wall with an equal volume of gabions wall would reduce soil retention strength, primarily due to lower wall weight. In order to replace a masonry wall with a gabion structure having equivalent load bearing and force resisting capacity, the gabion structure must be larger (wider, taller, deeper, or some combination thereof) than the masonry wall it would replace, necessitating greater volumes of gabions.[138]

CSXT's Engineering Experts corrected TPI's gabion quantities using the following conversion process and calculations. To determine the correct gabion-to-masonry substitution ratio, it is necessary to determine both the average weight of a cubic yard of masonry and the average weight of a cubic yard of gabion. Masonry walls are composed of units of solid material like that found near the right-of-way. The ICC Engineering Report lists examples of this material, including: blocks of cut stone, cobbles, rubble, and (in some cases) concrete or brick.

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[136] *See* CSXT Reply WP "Zhou- Geol_Eng — Earth_Retaining_Structures.pdf" at 10.1.1 ("Gravity walls . . . support the soil and, through their weight and stiffness, resist sliding, overturning, and shear.").

[137] *Id.*

[138] *Cf.* TPI Op. WP "TPIRR Open Grading.xls," Tab "Other Items," cell K37.

In the regions that the TPIRR traverses, the most common stone that could be used for masonry would be sandstone and soft- to medium-density limestone.[139]

Sandstone and limestone have solid unit weights of 140 pounds per cubic foot and 138 pounds per cubic foot, respectively (averaging 139 pounds per cubic foot).[140] The broken-stone unit weight of both types of stone is 90 pounds per cubic foot. These attributes produce an average of 3,753 pounds per cubic yard of sandstone/limestone masonry. A gabion basket containing one cubic yard of broken sandstone or limestone, in contrast, weighs only 2,430 pounds.[141]

The quantity of gabions needed to replace all the masonry walls in the ICC Engineering Reports is equal to the ratio between the weight of masonry that is being replaced and the weight of gabion that will be used to replace the masonry (slightly over 1.54:1),[142] multiplied by the total quantity of masonry being replaced. Design charts created by Maccaferri use the same type of calculation when substituting solid stone gabion basket unit weights for broken stone gabion basket unit weights for gravity retaining walls.[143] Applying these calculations, CSXT's Engineering Experts corrected the volume of gabion required for the TPIRR.[144] As explained above, this approach is consistent with Board precedent. *See DuPont*, STB Docket Number 42125 at 178; *SunBelt*, STB Docket No. 42130 at 123.

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[139] *See* CSXT Reply WP "USGS AL Limestone.pdf' and "USGS MS Limestone.pdf."

[140] *See* CSXT Reply WP "Retaining_Wall_Diagram.pdf," drawing "RET_WALL-1."

[141] *See* CSXT Reply WP "Maccaferri.pdf," section "Effective weight of a structure made up with gabions."

[142] This calculation is as follows: 3,753/2,430 = 1.54. *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Gabion Retaining Walls."

[143] *See* CSXT Reply WP "Retaining_Wall_Description.pdf," section: "Effective weight of a structure made up with gabions," Table 2.

[144] *See* CSXT Reply WP "Retaining_Wall_Diagram.pdf." TPI also omitted several quantities of retaining wall material reported in ICC Engineering Reports as summarized above.

iv. Rip-rap

CSXT rejects TPI's quantity of rip-rap, but accepts its unit cost. TPI incorrectly recorded the rip-rap quantities reported in the ICC Engineering Reports. CSXT has corrected TPI's misstatement of those quantities in this reply.[145]

v. Relocating and Protecting Utilities

CSXT accepts TPI's costs for relocating and protecting utilities.

vi. Seeding/Topsoil Placement

CSXT rejects TPI's embankment protection quantities, and rejects TPI's use of the Trestle Hollow Project unit cost for seeding due to all the flaws in TPI's attempt to extrapolate from that unrepresentative project, discussed above. *See supra* III-F-2-a. CSXT used the more representative seeding unit cost from R.S. Means to calculate total seeding cost.[146] This is consistent with recent Board decisions. *See DuPont* STB Docket No. 42125 at 180; *SunBelt,* STB Docket No. 42130, at 136.

vii. Water for Compaction

Water for compaction for dry soils along the TPIRR route and drying of wet soils along the route are addressed in Section III-F-2-d-ii-(h) (Subgrade Preparation), *supra.* CSXT rejects TPI's unit cost and quantity of the water needed for compaction, although it agrees that water for compaction is necessary as represented in TPI's workpapers, which is consistent with Board precedent. *See DuPont* STB Docket No. 42125, at 183; *SunBelt,* STB Docket No. 42130, at 113; *TMPA I,* 6 S.T.B. at 707.

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[145] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Eng Rep Input," Cells AA146 and AA159.

[146] *See* CSXT Reply WP "TPIRR Open Grading CSXT Reply.xlsx," Tab "Unit Costs."

viii. Surfacing for Detour Roads

CSXT accepts TPI's costs for surfacing detour roads.

ix. Environmental Compliance

CSXT accepts TPI's costs of environmental compliance.

3. Track Construction[147]

Track construction includes the materials, labor and equipment required to lay track once the subgrade has been completed. This includes acquiring, transporting, and placing all track-related components including subballast, ballast, ties, rail, other track materials and other specialized items. TPI's own track construction evidence included a number of conceptual and implementation flaws that understated the TPIRR track construction costs. CSXT's Track Engineering Experts have corrected TPI's errors in this Reply Evidence. In addition, as described in Section III-B-1, the TPIRR configuration presentation by TPI did not have sufficient mainline, siding, and yard tracks to serve its customers. On Reply, CSXT has adjusted the TPIRR track construction quantities to account for the necessary additional track mileage set forth above in Section III-B. Table III-F-13 below compares TPI's Opening TPIRR track construction costs with the corrected costs provided by CSXT in this Reply.

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[147] Section III-F-3 of CSXT's Reply Evidence is sponsored by CSXT witnesses Michael Baranowski of FTI Consulting, Robert Phillips of STV, Paul Bobby, and Patrick Bryant. All of these experts' qualifications are further detailed in Section IV. These experts are sometimes collectively referred to herein as "CSXT's Track Engineering Experts."

Table III-F-13
TPIRR Track Construction Cost Comparison
($ thousands)

Item	TPIRR Open	CSXT Reply	Difference
1. Geotextile Fabric	$3,506	$4,081	$575
2. Ballast & Subballast	$1,688,413	$2,878,194	$1,189,781
3. Ties	$1,280,443	$1,755,055	$474,612
4. Track (Rail)		$0	$0
a. Main Line	$2,190,548	$2,455,218	$264,670
b. Yard and Other Track	$305,463	$499,921	$194,458
c. Field Welds	$31,311	$64,776	$33,465
d. Switches (Turnouts)	$710,332	$869,223	$158,891
e. RR Crossing Diamonds	$24,161	$24,160	$0
5. Rail Lubricators	$13,235	$13,685	$450
6. Plates, Spikes and Anchors	$769,662	$856,645	$86,983
7. Derails and Wheel Stops	$9,292	$10,118	$826
8. Switch Heaters	$10,328	$10,328	$0
9. Track Labor and Equipment	$1,457,879	$1,549,447	$91,568
10. Total	$8,494,573	$10,990,852	$2,496,279

Source: CSXT Reply WP "Track Construction CSXT Reply.xlsx"

a. Geotextile Fabric

CSXT accepts TPI's geotextile specifications and unit costs. CSXT's Track Engineering Experts increased the number of turnouts (which require geotextile materials), consistent with adjustments CSXT made to the TPIRR Configuration and Operation plan (sometimes referred to hereinafter as the "CSXT Reply Operating Plan").

b. Ballast

CSXT accepts TPI's method of estimating ballast quantities, and has adjusted TPIRR ballast quantities consistent with changes in the number of track miles required by the CSXT Reply Operating Plan. CSXT rejects TPI's development of the average cost of ballast, which contains a number of flaws and errors. As detailed below, TPI's average ballast costs are understated because it erroneously included ballast suppliers adjacent to the TPIRR route; it used incorrect transportation distances; it failed to weight the average material and transportation costs by the amount of ballast that the TPIRR would procure from each supplier; and it used an erroneous and unsupported off-line transportation cost per ton-mile.

i. Ballast Quantities

CSXT's Track Engineering Experts accept TPI's method of calculating ballast quantities and use that same methodology to adjust the TPIRR ballast quantities to be consistent with the track miles required by CSXT's revised TPIRR operating plan.[148]

ii. Ballast Pricing

TPI derived its TPIRR unit costs for ballast from ballast price information CSXT produced in discovery, to which TPI added costs for transportation from the relevant supplier to the TPIRR railheads and from the railheads for placement along the right of way. TPI's average ballast costs include a number of conceptual and calculation errors that result in the understatement of TPIRR ballast costs. Those errors, and CSXT's corrections are described below.

(a) TPI Erroneously Included Suppliers Along the (Unbuilt) TPIRR Route in Its Development of Average Ballast Costs.

TPI's proffered ballast costs included ballast suppliers located on the TPIRR route, which would not be accessible by rail during the construction of the TPIRR. TPI derived its ballast material unit price per ton from an average of fourteen (14) CSXT supplier prices based on information provided by CSXT in discovery. CSXT's Track Engineering Experts prepared a map of the TPIRR route, and plotted the CSXT ballast supplier locations on that map.[149] As that

[148] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "User Input."

[149] *See* CSXT Reply WP "TPIRR Ballast Quarries Map.pdf."

map shows, five (5) of TPI's designated ballast suppliers would be on the TPIRR system, and lack access to any other foreign railroad or to the residual CSXT. Because these quarries are exclusively served by portions of the CSXT that would be replaced by the TPIRR, there would be no way to ship ballast by rail during construction of the TPIRR before its track is laid.[150] Based on the TPI's assumed production rate for building track, the quarry in Junction City, GA would become accessible early in the TPIRR construction. CSXT accepts the use of this quarry once it becomes accessible by rail. The remaining four quarries would not be available to TPI during construction due to their locations along the lines of the TPIRR:

1) Tyrone, GA
2) Lithonia, GA
3) Notasulga, AL
4) Skippers, VA[151]

As the Board established in *Otter Tail*, the route of a SARR under construction cannot be assumed to be available to transport materials required for construction of the SARR. *See Otter Tail,* STB Docket No. 42071, at D-26 ("We have found that it would not be proper to assume that a SARR could transport materials over the very lines that the SARR would need to build."). That standard applies equally to the TPIRR. Under TPI's proposed construction schedule, the TPIRR would be built rapidly and simultaneously over a wide geographic area. Accordingly, there would be gaps in the TPIRR network until near the end of construction, both because the

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[150] CSXT's Track Engineering Experts determined the cost of trucking ballast from these quarries to the TPIRR right of way would be economically inefficient. In the first instance, the rates for trucking ballast are substantially higher than rail rates for transporting ballast. Additionally, trucked ballast would have to be unloaded along the side of the right-of-way, and then re-loaded into ballast cars by a work train performing final installation.

[151] *See* CSXT Reply WP "Ballast Prices by Supplier and Location CSXT Reply.xlsx" and "TPIRR Ballast Quarries Map.pdf."

TPIRR would be constructed in 97 separate track construction packages and because construction would involve many more- time-consuming projects such as the Ohio River bridge in Cincinnati and the Bakers Hill tunnel in Tennessee. These lengthy construction projects would render the TPIRR route discontinuous and unavailable for on-line shipment of materials from suppliers to TPIRR construction railheads. Therefore, during construction, the TPIRR could not use its future lines to transport ballast to itself.

Further, because of the quantities required and the limited number of suppliers selected by TPI, ballast for the TPIRR track could not be efficiently transported by truck and would move by rail. The residual CSXT lines and the lines of other railroads necessarily would be used for the delivery of ballast to the TPIRR railheads. This is fully consistent with the fact that railroads in the real world must pay to transport ballast over foreign lines from quarries to the destination carrier's system.[152] CSXT's Track Engineering Experts determined that the remaining nine (9) existing CSXT suppliers selected by TPI are located along CSXT lines not replicated by the TPIRR and could ship ballast over foreign lines.[153] Due to locations of the quarries (multiple quarries are located in the same small areas), CSXT uses six (6) quarries to supply ballast for the TPIRR.[154] To select the quarries to supply the TPIRR, CSXT determined which quarry would best serve each railhead based on proximity. CSXT's Track Engineering Experts did not source ballast material from the other three quarries identified by TPI because use of those sources

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[152] *See, e.g.,* CSXT Reply WP "Progressive Railroading Ballast Article," *available at* http://www.progressiverailroading.com/CSXT_transportation/article/Class-I-MOW-Executives-InTheir-Own-Words--13196 (comments of FEC MOW executive that railroad that cannot use its own trains to transport ballast "must pay the going freight rates to and from our ballast source").

[153] *See* CSXT Reply WP "Ballast Prices by Supplier and Location CSXT Reply.xls."

[154] The Board recently accepted similar ballast quarry supplier modifications in *SunBelt*, STB Docket No. 42130, at 121-130. *See also* CSXT Reply WP "Ballast Prices by Supplier and Location CSXT Reply.xlsx."

would result in higher delivered ballast costs to the TPIRR. Table III-F-14 below demonstrates that the three quarries not selected have higher costs than the selected alternatives.

Table III-F-14
Quarries Not Selected Due to Higher Costs

Detail	Quarries Not Assigned Ballast Quantities		
	Augusta, GA	Cayce, SC	Greystone, NC
Closest Railhead	Atlanta, GA	Atlanta, GA	Richmond, VA
Miles to Railhead	255.7	280.8	229.7
Delivered Cost	$29.49	$31.33	$27.69
Selected Quarry for Closest Railhead	Junction City, GA	Junction City, GA	Luck, VA
Selected Quarry Delivered Cost	$22.14	$22.14	$9.87

The full analysis, which is described in more detail below, resulted in the TPIRR's use of six quarries from TPI's original 14.

(b) TPI's Calculation of the Average Cost of Ballast for the TPIRR Is Not Weighted by the Relative Quantities from Each Supplier.

CSXT accepts the unit prices used by TPI for the remaining six best serving quarries but rejects TPI's application of a simple average to determine a system-wide price for TPIRR ballast. Use of the simple average understates the cost for ballast that the TPIRR would incur. As part of an efficient ballast distribution plan, the location of some quarries would result in their supplying much more ballast than others for constructing the TPIRR. Therefore, the TPIRR ballast unit price should be weighted accordingly. TPI's implicit assumption that the same amount of ballast would be supplied by each of the nine suppliers would require the TPIRR to incur very substantial additional transportation charges from the more distant suppliers to the construction railheads. TPI did not account for such added transportation costs.

For example, TPI selected only one ballast quarry, located in Toledo, OH, to supply all of the ballast for segments of the TPIRR located in the Midwest, which constitutes a large portion of the TPIRR system.[155] This quarry has the highest ballast price, which is to be expected due to the scarcity of ballast quality stone in the Midwest region. Other quarries selected by TPI are located in the Appalachian region and the Southeastern U.S., which have abundant supplies of suitable rock for ballast and correspondingly lower unit prices.

TPI cannot have it both ways. If the TPIRR benefits from lower transportation costs due to the close proximity of the quarry to a portion of its system, it must pay the prevailing material prices for ballast in the area. As discussed below, CSXT's Track Engineering Experts determined which of the ten ballast quarries most cost effectively could supply ballast for different portions of the TPIRR, and calculated the resulting transportation distances and material costs accordingly, weighted by distances to the designated TPIRR construction rail heads.[156]

(c) Ballast Material Transportation From Supplier to Railhead.

To transport the ballast it purchases from various suppliers, the TPIRR would rely on a combination of the residual CSXT and other rail carriers to transport the ballast from the

[155] Ohio, Indiana, and Illinois have 1,717 of the TPIRR route miles. *See* TPI Op. WP "TPIRR Route Miles Opening Grading.xlsx," Tab "Location Factors."

[156] CSXT's decision to rely entirely on the ballast quarries selected by TPI is guided by the Board's decision in *DuPont*. In that case, the Board rejected the railroad's proposed addition of two new ballast locations to fill supply gaps because they were not produced in discovery. *See DuPont*, STB Docket No. 42125, at 191. While CSXT believes adding new quarries to account for supply gaps is a reasonable approach, it accepts that a quarry, for example in Toledo, OH, might under the theory of unconstrained resources supply enough ballast for a significant portion of the TPIRR system.

supplying quarries to the TPIRR's railheads. That ballast then would be transported from those railheads to the locations along the right of way where it would be installed in the track structure. The TPIRR would therefore incur two distinct types of ballast transportation costs: (1) the cost of transporting ballast via the residual CSXT and other rail carriers to the TPIRR railheads; and (2) the cost to distribute ballast from the TPIRR railheads to points of installation along the TPIRR roadbed. It appears from the limited documentation TPI provided that it recognized the need for these distinct transportation components. But TPI fails to explain either how it developed the mileages used in its evidence or what those mileages purport to represent. TPI also assumed an unrealistically low transportation cost of 3.5 cents per-ton mile.[157]

TPI's proffered distances to which it applies its transportation cost per ton mile are unsupported and flawed. For the transportation from the quarry to the railheads, TPI purported to develop what it described as "average shipping distances." *See* TPI Opening III-F-30. TPI provided no workpapers or other documentation detailing how it arrived at these "average shipping distances," and CSXT's Track Engineering Experts were unable to replicate TPI's mileage figures. It appears that TPI may have simply measured the linear distance from quarry locations to some undefined point along the TPIRR for the quarries that are located off the TPIRR route, and then arbitrarily increased those distances by some unexplained percentage.[158] For the five quarries located on the TPIRR route, TPI assumed zero transportation distance.[159]

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[157] TPI supplied no supporting workpapers or references to support its proffered shipping cost of $0.035. The Board recently rejected similar evidence proffered by a complainant. *See DuPont*, STB Docket No. 42125, at 191.

[158] *See* TPI Op. WP "Ballast Shipping Distances.pdf," Line 4 and CSXT Reply WP "Springfield, MA Quarry TPI Dist Calc.png."

[159] *See* TPI Op. WP "Ballast Shipping Distances.pdf."

TPI's approach for determining off-line transportation distances is flawed in a number of significant respects. *First*, its results are undocumented and unsupported. *Second*, there is no way to determine to which railheads the transportation is assumed to occur. *Third*, TPI's distance additive—if that is indeed what it did—is unexplained and unsupported. To the extent that TPI might have intended to apply a circuity factor to account for the difference between distances calculated along a straight line and distances over the route of existing rail lines, it failed to disclose, explain, or justify this rationale and it failed to explain or support the percentage or other additives it applied.[160]

CSXT's Track Engineering Experts reject the unsupported transportation distances from the suppliers to TPIRR railheads proffered in TPI's case-in-chief. Instead, CSXT's Track Engineering Experts conducted a detailed analysis to identify the most efficient rail transportation options to deliver ballast to each of the TPIRR railheads from the ten quarries discussed above. CSXT's Track Engineering Experts then calculated an average transportation distance from these sources to the TPIRR railheads. This analysis is detailed in CSXT's Reply workpapers and is summarized in Table III-F-13 below.[161]

Based on the ballast sourcing assumptions described above, CSXT's Track Engineering Experts calculated the average quarry–to-railhead transportation distance as 265.1 miles. This does not include the cost of transportation of ballast for distribution along the TPIRR right-of-way itself, which is addressed in the following section. *See infra* III-F-3-b-ii-(d). CSXT uses

[160] *See* CSXT Reply WP "Springfield, MA Quarry TPI Dist Calc.png & Ballast Prices by Supplier and Location CSXT Reply.xls."

[161] *See* CSXT Reply WP "TPIRR Ballast Quarries Map.pdf;" CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "BALLAST REPLY COST" (On TPIRR portions of mileage are listed on lines 9 to 16); CSXT Reply WP "Off Residual CSXT Ballast Transportation Mileage Maps" and CSXT Reply WP "Ballast Transportation mileage to TPIRR from Quarries.xls"(Off TPIRR portions of mileage are broken down in this file).

this 265.1 mile distance to calculate costs for ballast transportation by the residual CSXT or other foreign carriers.[162]

Table III-F-15

TPI Railhead	TPI Quarry Selected as supplier to Railhead	Mileage by rail from supplier to TPIRR Railhead	CSXT 2010 Price for this location
Chicago, IL	Toledo, OH	243.1	$14.63
Fostoria, OH	Toledo, OH	35.0	$14.63
Syracuse, NY	Springfield, MA	336.8	$9.80
East St. Louis, IL	Toledo, OH	441.5	$14.63
Cincinnati, OH	Toledo, OH	282.7	$14.63
McKeesport, PA	Verdon, VA	552.9	$11.95
Richmond, VA	Luck, VA	5.1	$9.50
Fayetteville, NC	Lemon Springs, NC	75.6	$11.40
Atlanta, GA	Junction City, GA	155.0	$10.83
Montgomery, AL	Junction City, GA	250.6	$10.83
Jacksonville, FL	Junction City, GA	312.5	$10.83
Nashville Alternatives	*See Below*	*490.6*	*$12.78*
Average		**265.1**	**$12.20**

Source: CSXT Reply WP "Ballast Prices by Supplier and Location CSXT Reply.xlsx" and CSXT Reply Folder "Ballast Shipping"

(d) Ballast Material Distribution Along the TPIRR Right of Way.

In addition to the off-TPIRR transportation from source quarries to the construction railheads, ballast must be moved along the TPIRR routes and right-of-way from its construction railheads to the locations where the ballast would be placed. TPI calculated an average distance of 37 miles for what it calls "railhead haul,"[163] covering the distances from the railhead to

[162] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "Ballast ML Tangent."

[163] The 37 miles of "railhead haul" distance for ballast conflicts with TPI's calculation of average "railhead haul" distance used elsewhere. *Compare* TPI Op. WP "Track Construction.xlsx," Tab "Ballast ML Tangent," at cells C20, *with* Tab "Mileage Matrix for Suppliers," at cell F18.

placement in the track based on the average length of the TPIRR segments. CSXT accepts that average distance.

(e) Material Transportation Unit Cost for Ballast.

TPI further understated ballast transportation costs by using an estimated unit cost applicable to on-line rail transportation costs to approximate off-line rail transportation costs. TPI applied a unit price of $0.035 per ton-mile to calculate off-line rail transportation costs on the ground that price was "a transportation charge from *AEPCO*." TPI Opening III-F-24. The Board rejected the same fallacious argument in *DuPont*. *See DuPont*, STB Docket No. 42125, at 193 (accepting NS unit costs for off-line transportation).

Further, TPI's claim is seriously misleading, because while the $0.035 per ton mile price is "from" *AEPCO 2011* in the sense that the number appeared in the Board's decision, the Board did not accept that price for off-line rail transportation. In *AEPCO 2011*, the complainant proposed "an on-line (ANR system) shipping cost of $0.035 per ton mile, and a [separate] hardcoded unit price for the off-line transportation costs." *AEPCO 2011*, STB Docket No. 42113, at 99 (emphasis added). While the actual unit price proposed by the complainant for off-line transportation was highly confidential, it is clear that the Board did not accept use of the $0.035 cost for off-line transportation. Indeed, in responding to the defendant's evidence, the Board in *AEPCO 2011* emphasized that a $0.035 estimate would be "a conservative cost," because it represented "the cost a railroad would charge itself for shipping on its own lines, when the [SARR] would need to ship ballast over other carriers' lines." *Id.* at 100. Even as an on-line ballast transportation cost, the $0.035 per ton mile transportation cost is outdated—it is based upon a 1994 price used by the Board in *Arizona Public Service Company v. Atchison, Topeka & Santa Fe Railway Company*, STB Docket No. 41185. Because that price reflects a railroad's cost to move materials over its own lines and because it is from more than 20 years ago with no indexing to account for inflation, the $0.035 per ton mile transportation cost certainly is not a reliable estimate of the TPIRR's off-line ballast transportation costs. TPI provided no evidence of current costs for transporting ballast on CSXT or on foreign railroads, and accordingly may not do so on Rebuttal. *See SAC Procedures*, 5 S.T.B. at 445-46.

As discussed previously, because the TPIRR rail lines would not yet be built, construction materials assumed to move by rail must be transported from the source to the construction railheads using non TPIRR rail service over either the residual CSXT or another carrier. *See*, *e.g.*, *Otter Tail*, STB Docket No. 42071, at D-26 ("It would not be proper to assume that a SARR could transport materials over the very lines that the SARR would need to build."). To determine the actual cost that the TPIRR would incur shipping its ballast on the lines of the residual CSXT and over the lines of other carriers, CSXT's Track Engineering Experts contacted aggregates supplier Vulcan Materials Company to obtain the rate for transporting ballast materials.[164] Based on the price per ton and length of haul provided by Vulcan for shipping a carload of ballast, CSXT's Track Engineering Experts determined that the per-car cost for transporting ballast in a 100-ton open-top hopper car, indexed to 2010 levels is $0.703 per ton-mile.[165] The Board accepted a similar price in its recent decision in *DuPont*. *See DuPont*, STB Docket No. 42125, at 193.

For the portion of the ballast transportation from the railhead to placement in the TPIRR track, which would be accomplished by moving carloads of ballast over the unfinished TPIRR track structure, CSXT's Track Engineering Experts accept TPI's $0.035 per ton-mile as a surrogate for the cost the rail construction contractor would incur in performing that service.

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[164] *See* CSXT Reply WP "Scanned Vulcan Transportation Information.pdf."

[165] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "BALLAST SHIPPING COST."

This results in a weighted average price per-ton mile of 0.073 per ton-mile applied to the total ballast transportation distance of 265.1 miles.[166]

iii. Subballast

(a) Subballast Quantities

TPI specified a subballast section of 6" on all mainlines, single and multiple tracks, 4" on yard tracks and 4" on set out tracks. CSXT's Track Engineering Experts accept these assumptions. TPI further assumed that subballast consists of similar parent materials as ballast crushed to provide a well-graded, dense layer of crushed rock similar to road base material and that it would be supplied from the same locations as the ballast. As explained in more detail below, CSXT's Track Engineering Experts accept TPI's general specifications for subballast but reject TPI's assertion that subballast would be sourced only from the same locations as those supplying ballast, because that assumption is inconsistent with the need to deliver subballast by truck.

In addition, without providing an explanation in its narrative evidence, TPI's workpapers reduced TPIRR subballast quantities, apparently removing subballast beneath grade crossings.[167] CSXT rejects this unexplained and unsupported elimination of necessary of subballast. Subballast and prepared subgrade are required at grade crossings as a best practice under CSXT specifications.[168] CSXT's Reply corrects this omission, and also adjusts TPI's subballast quantities to reflect the number of TPIRR track miles required by CSXT's reply operating plan.[169]

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[166] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "Ballast ML Tangent."

[167] *See* TPI Op. WP "Track Construction.xlsx," Tab "Summary," Row 49.

[168] *See* CSXT Reply WP "CSXT Crossing Specs.pdf."

[169] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "User Input."

(b) Subballast Material Costs

TPI relied solely on the Trestle Hollow Project for its unit price for subballast. TPI asserted, without support, that this unit price included both the cost of transportation and placement in the roadbed. *See* TPI Opening III-F-30. As demonstrated, TPI's Trestle Hollow Project unit prices are unsupported and not representative of the geographically diverse and expansive 6,866 mile TPIRR system. *See supra* III-F-2-a. TPI does not attempt to prove or justify its assumption that the unit price for subballast specific to a single isolated shortline project, located in south central Tennessee, would apply the entire TPIRR system. Nor did TPI even attempt to explain how the transportation characteristics of delivering subballast to the Trestle Hollow Project would be comparable to those of delivering subballast to the entire TPIRR system. Further, the Board recently rejected the use of the same unit costs from the Trestle Hollow project in both *DuPont* and *SunBelt.*[170] For the foregoing reasons, CSXT's Track Engineering Experts reject TPI's proposed unit costs. As detailed below, CSXT's Track Engineering Experts have developed reasonable subballast material and transportation unit costs from representative third party price quotes.

To develop subballast unit prices that reflect the prices the TPIRR would actually be required to pay, CSXT's Track Engineering Experts identified suppliers from locations along the proposed TPIRR route and obtained both material and transportation price quotations from each supplier.[171] These subballast materials must be delivered to the installation location by truck in order to ensure product quality and to minimize costs. The geographic scope of the TPIRR

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[170] *See DuPont*, STB Docket No. 42125, at 203 ("The Board will also accept NS's costs and quantities for subballast because, as discussed above, the Board is rejecting the use of Trestle Hollow Project. As such, NS's price quotes from various suppliers and its use of Means represent the best evidence of record."); *See SunBelt*, STB Docket No. 42130, at 132 (similar rejection of Trestle Hollow costs for subballast).

[171] *See* CSXT Reply WP "Sampling of Subballast Pricing.pdf."

means that there must be numerous subballast suppliers within reasonably close proximity to the TPIRR roadbed. Because subballast is similar to the crushed stone used for highway road base material, CSXT's Track Engineering Experts assumed that suitable subballast suppliers will be available along the TPIRR route. CSXT's Track Engineering Experts used an assumed 40 mile average delivery distance, which would allow for there to be a potential approved supplier every 160 miles along the TPIRR.[172] The average resulting corrected TPIRR price for subballast material and transportation is $17.52 per ton.[173]

(c) Subballast Material Placement Costs

The CSXT Track Engineering Experts reject TPI's method of estimating cost of placing subballast along the roadbed. TPI attempted to derive a placement cost from R.S. Means by adding the equipment and labor cost and excluding material from the aggregate placement operation 32-11-23-2021 "Aggregate Base Course – Crushed stone 6" deep."[174] CSXT agrees that this operation adequately accounts for cost of placing subballast but rejects TPI's method of deriving a unit cost. TPI failed to include cost for overhead and profit (O&P) in its subballast placement cost. This is a clear error that understates final cost of subballast. All other unit costs developed from R.S. Means by both TPI and CSXT included O&P as instructed by R.S. Means. [175] CSXT instead developed a subballast installation cost using R.S. Means 2010, similar to TPI, but including labor, equipment, and O&P. CSXT's derived its corrected installation cost from

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[172] CSXT's Track Engineering Experts used a 40 mile average distance to allow for the practical use of trucks making 4 round trips in an average 8 hour day. If trucks average 40 mph and take little time to actually unload at the spreader box they can make around 4 trips per day. This assumption is based on the experience of CSXT's Track Engineering Experts with maximum haul distances in the road and railroad construction industry.

[173] *See* CSXT Reply WP "Track Construction CSXT Reply," Tab "SUBBALLAST REPLY COST," cell F37.

[174] *See* TPI WP "Base Placement RS Means 2012.pdf."

[175] *See* CSXT Reply WP "R.S. Means How to section.pdf."

Aggregate Base Course section of R.S. Means, and included suitable equipment and labor to place subballast.[176] The resulting adjusted cost of installing subballast is $3.77 per ton.[177]

c. **Ties**

TPI's engineers selected 7" x 9" x 8"6' Grade 5 wood ties spaced 20.5 inches apart for all main track, passing sidings, and branch lines consistent with the railroad industry standards for mainline tracks. For yard and set-out tracks, TPI used the same tie specifications spaced 24 inches apart. *See* TPI Opening III-F-30. CSXT's Track Engineering Experts accept TPI's proposed tie type and spacing. Using American Railway Engineering and Maintenance-of-Way Association ("AREMA") Guidelines, CSXT's Track Engineering Experts verified the subgrade pressures for the various TPIRR rail and tie combinations and found they were acceptable with use of 136# and 115# rail for the maximum mainline and yard and siding speeds specified by TPI.

TPI derived its unit costs for ties from Schedule 722 of CSXT's 2010 from R-1. However, this unit cost does not cover costs for the Grade 5 wood ties that TPI specified for the TPIRR. Schedule 722 states that the category of ties from which TPI derived its unit cost is for "Wooden ties, treated before application," but clearly does not limit this to the Grade 5 ties of the dimensions selected by TPI.[178] CSXT's general tie cost information would be inapplicable for determining costs for TPI's specific type of tie because it includes costs for other grades and sizes of ties. In fact, the 2010 R-1 cost information used by TPI is almost entirely related to the costs for yard and siding track ties, as opposed to costs for mainline track ties. Mainline track

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[176] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "SUBBALLAST REPLY COST."

[177] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "SUBBALLAST REPLY COST."

[178] *See* TPI Op. WP "Tie Cost – Page 87 from CSX 2010 R-1 Revised.pdf."

requires high quality ties with minimal structural defects in order to support heavy tonnage and high speeds. Yard and siding ties support much lighter loads and significantly slower speeds. Accordingly, carriers typically use lower grade material and much smaller dimensions for yard and siding ties in comparison to mainline ties.[179]

As Table III-F-16 below depicts, in 2010 the vast majority of treated wooden ties that CSXT installed were ties for yard tracks rather than mainline tracks. In contrast, in 2009 CSXT installed considerably more treated wooden ties in mainline tracks rather than yard tracks, resulting in a significantly higher average price.

Table III-F-16

Tie Costs Reported in Schedule 722 of CSXT's R-1 Annual Report

Year	Average Price for Treated Wooden Ties	Number of Treated Wooded Ties Applied	Number of miles of mainline, passing, crossover track in which ties were laid	Number of miles of new yard, station, team, industry, and other switching track in which ties were laid
2009	$53.74	38,924	5.69	1.03
2010	$35.47	22,443	0.06	9.47

Table III-F-16 shows that the reason TPI used an average price of $35.47 per tie from CSXT's 2010 data—even though suppliers at each of the plants TPI claims to use as suppliers quoted prices ranging from $42.99 to $45.15—is that the costs in CSXT data for 2010

[179] Although TPI specified that the same tie size would be used for TPIRR main line and yard and siding tracks, albeit with different spacing, CSXT, like most carriers, uses smaller and lesser Grade 3 ties for its yard and siding track. *See, e.g.*, CSXT Reply WP "CSXT Tie Specifications.pdf" (CSXT Manual specifies mainline ties "shall be" Grade 5 (7" x 9" x 8.6") or 4, while sidetrack ties "shall be" smaller Grade 3) (publicly available at http://www.csx.com/share/wwwcsx_mura/assets/File/Customers/Services_and_Partners/CSX_Industrial_Sidetrack_Manual_063003.pdf).

predominately were for different, less expensive types of yard track ties.[180] CSXT's Track Engineering Experts reject TPI's proposed tie price of $35.47, and instead apply the average price of $44.60 from the three suppliers that TPI identified in its opening evidence.

CSXT accepts TPI's assumption that off-line transportation costs are not included in the amounts reported by CSXT in its R-1 and that such costs therefore should be added to determine reasonable tie costs.[181] CSXT has corrected TPI's development of off-line tie transportation costs to conform to TPI's assumption that ties would be transported from the supplier to the TPIRR railheads by truck. Specifically, CSXT accepts the 256 mile average shipping distance TPI used for ties, which it calculated using trucking distances from the closest of the three suppliers identified by TPI—in Guthrie, KY, Muncy, PA, and Florence, SC—to the various railheads.[182] However, even though TPI specified that ties would be shipped by truck, it applied an unsupported and unexplained cost $0.035 per ton-mile to ship these ties which, as demonstrated above, is an outdated cost associated with on-line rail transportation.[183] The CSXT Engineering Experts reject this transportation cost and instead apply tie transportation cost of $0.092 per ton-mile, which is based upon a price quote obtained from McCord Tie and Timber tie vendor.[184] The Board has accepted this method in recent cases. *See DuPont*, STB Docket No. 42125, at 194-95 and *SunBelt*, STB Docket No. 42130, at 132.

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[180] *See* TPI Op. WP "Track Construction," Tab "Ties," Line 18.

[181] *See* TPI Op. WP "Track Construction," Tab "136 RE Rail," cell C23.

[182] *See* TPI Op. WP "Track Construction," Tab "Mileage Matrix for Suppliers," at line 9 *and* Tab "Ties," at line 18. This is consistent with CSXT using an average price for the three locations.

[183] *See* TPI Op. WP "Track Construction," Tab "Ties," at line 20. This is contrary to TPI's claim that "materials that cannot be shipped by rail have been priced with shipping by truck to one or more of the road access points along the TPIRR's lines." *See* TPI Opening III-F-37.

[184] *See* CSXT Reply WP "McCord Tie and Timber Transportation Information.pdf."

d. Rail

i. Main Line, Yards, and Sidings

TPI proposed rail sections using 136-pound Continuous Welded Rail ("CWR") for most of the TPIRR main tracks and passing sidings (for segments carrying 20 Million Gross Ton ("MGT")/year or greater), with premium rail deployed on curves of three degrees or greater. *See* TPI Opening at III-F-31. On light-density segments of the TPIRR (less than 20 MGT/year), TPI proposes to use new 115-pound CWR. In yards and for helper and set out tracks TPI proposed to use 115-pound CWR. CSXT accepts these TPI specifications.

ii. Rail Pricing

TPI developed its price of $857 per ton for CWR from information reported in CSXT's 2010 Annual Report R-1, which CSXT accepts. CSXT also accepts TPI's assumption that the rail prices reported in the CSXT R-1 do not include any off-line transportation costs, and agrees with TPI's methodology for calculation of off-line railroad transportation miles from the rail suppliers to the TPI railheads. TPI developed its off-line transportation miles assuming that the TPIRR rail would be sourced from a rail manufacturing plant in Steelton, PA. CSXT accepts this assumption. However, CSXT rejects TPI's proposed unit cost for transporting rail from the manufacturer to the railheads.[185]

TPI's proposed transportation cost per mile is unsupported and unreliable. TPI used a cost of $0.035 per ton-mile, but provided no backup or support for that figure. Instead, TPI's only justification for using this cost is the indefinite claim that it was "based on a transportation charge from *AEPCO*." TPI Opening III-F-24. As CSXT has explained, this claim is incomplete; inaccurate, and misleading. *See supra* III-F-3-b-ii-(e).

[185] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "RAIL SHIPPING COSTS."

To correct this unsupported and unreliable transportation cost assumption, CSXT's Track Engineering Experts obtained a quote for rail delivery from Arcelor Mittal Long Carbon North America ("Mittal"), a major rail supplier, for full trains of CWR. Mittal quoted a price of $6,220 per car with $3,000 per day rental fee for every day after a three-day unloading period for fully loaded 30-car rail trains carrying 80,000 linear feet (40,000 track feet) of 136-pound rail shipped from Steelton, PA to Nashville, TN.[186] After adjusting this quote to the third quarter of 2010 price levels, the additional transportation cost for rail would be $6.295 per track foot, or $138.86 per ton for 136-pound rail.[187]

iii. Rail Unloading Costs

CSXT accepts TPI's rail unloading cost estimate.[188]

iv. Field Welds

TPI understated the number of field welds required for the TPIRR by counting only the welds needed to join 1,440 foot rail sections, 18 welds per panel turnout, and four welds per grade crossing. TPI omitted field welds required to install insulated joints and crossing diamonds. CSXT's Track Engineering Experts computed the number of field welds required at these locations and added costs for them.[189]

The CSXT's Track Engineering Experts reject TPI's field weld unit price. TPI stated in its opening narrative that its field weld unit cost was based on direct quotes and historical prices

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[186] *See* CSXT Reply WP "ALCNA_Rail_Quote.pdf." In the experience of the CSXT Track Engineering Experts, CWR contractors do not own rail cars, and the car rental fee quoted in the Mittal bid is fairly standard.

[187] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "RAIL SHIPPING COSTS," Cells C35 and C37.

[188] *See* TPI Op. WP "Track Construction.xlsx," Tab "136 RE Rail," cell C30; TPI Op. WP "Rail Train Costs.pdf."

[189] *See* CSXT Reply WP "Track Construction CSXT Reply.xls," Tab "Summary," cells D24 to D28.

from projects overseen by Crouch Engineering.[190] However, TPI only included a Bid Tabulation sheet from just one project, without any backup information stating what the bids included.[191] Also, TPI stated in its Trackwork spreadsheet "Quotes include labor and material,"[192] again without any support or backup. CSXT obtained a field weld quote that included a separate weld kit cost[193]. CSXT has included that separate weld kit cost to TPI's labor field weld unit price, and has applied that unit cost to the corrected quantities of field welds.[194]

v. Insulated Joints

Consistent with the approach used by TPI, the CSXT Reply discussion of insulated joints is included in the Signals and Communications sections of this Reply evidence. *See infra* III-F-6-a-iii.

e. Switches

CSXT's Track Engineering Experts generally accept TPI's specifications for TPIRR switches (*i.e.,* turnouts). TPI based its estimated costs for turnout installation on the TPIRR on quotes from suppliers and contractors.[195] TPI included the required cost elements for turnouts, namely materials cost, delivery charges, and installation labor, but made several mistakes in its computation of costs of these elements, primarily in connection with its calculations of transportation costs.

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[190] *See* TPI Opening at III-F-32.

[191] *See* TPI Op. WP "Bayline Weld Bid.pdf."

[192] *See* TPI Op. WP "Track Construction.xlsx," Tab "Field Weld."

[193] *See* CSXT Reply WP "CSXT Field Weld Quote Bankhead Railway Services.doc."

[194] *See* CSXT Reply WP CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "Field Weld," Cell C19.

[195] *See* TPI Op. WP "Track Construction.xlsx."

First, TPI made a significant error in calculating shipping costs for its No. 20 turnouts. TPI used a material unit cost from Unitrac in Knoxville, TN but computed its average shipping distance for that material from a different supplier's location in Decoursey, KY. CSXT corrected this error by using the actual average transportation distance from Unitrac's location in Knoxville.[196]

Second, CSXT corrects the transportation unit cost for turnouts, which TPI once again based on an outdated $0.035/ton-mile estimate for which it provided no documentary support. *See supra* III-F-3-b-ii-(e). CSXT's Track Engineering Experts obtained an actual current price quote from A&K Railroad Materials for delivery of panelized turnouts in gondola cars for $4,000 per car for a 500 mile delivery.[197] Indexing these costs to the third quarter of 2010 yielded a cost of $0.083 per ton-mile.[198]

Additionally, TPI neglected to install manual switch machines on yard turnouts. *See* TPI Op. WP "Track Construction.xlsx," Tab "Summary." CSXT develops costs for a standard 51A manual yard switch based on a quote from Kimes Steel and Rail Inc. and applies this cost to all yard turnouts other than those in hump yards, which are already equipped with power switches.[199]

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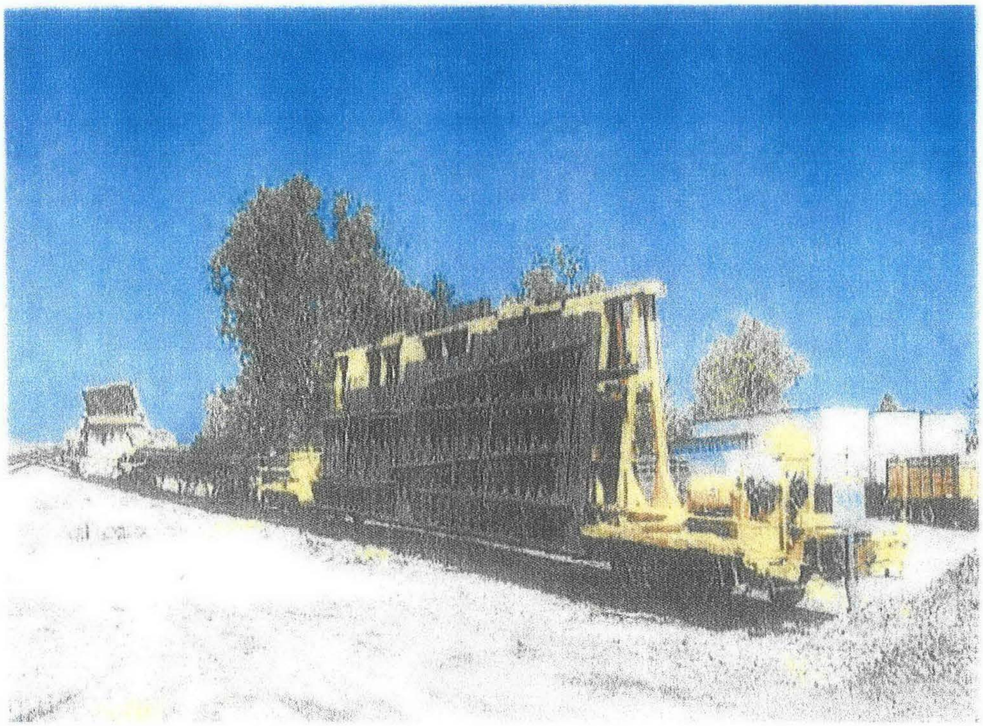
[196] *See* CSXT Reply WP "Track Construction CSXT Reply.xls," Tab "No. 20 Turnout" & Tab "matrix mileage."

[197] *See* CSXT Reply WP "AK Turnout Transportation.pdf."

[198] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "TURNOUT SHIPPING COST," cells C16.

[199] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "Manual Switch" and "Kimes K51A Manual Switch Quote.pdf."

Figure III-F-1
Panelized Turnout



f. Other

i. Rail Lubricators

CSXT rejects TPI's costs and quantities for rail lubricators. Here, TPI's quote failed to include costs of several lubricator components, including grease, track mat, and cost for lubricator installation. Without these components, the lubricators would not effectively limit wear on the TPIRR, which would cause increased maintenance costs.

CSXT requested a quote from the same manufacturer for the exact same lubricator that TPI specified.[200] The corrected unit cost is $7,623 per lubricator (which includes mats and installation).[201]

[200] *See* CSXT Reply WP "CSXT_Rail_Lubricator_LB_Foster.pdf."

[201] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "Rail Lubricator & Mats."

ii. Plates Spikes and Anchors

CSXT accepts TPI's basic specifications for other track materials including plates, spikes, and anchors. TPI again used the same stale, unsupported cost of $0.035 ton-mile transportation cost it used for other track materials. For the reasons described above at Section III-F-3-b-ii-(e), this outdated, unsupported and unexplained historical estimate is not a reasonable proxy for real-world TPIRR transportation costs. CSXT's Track Engineering Experts obtained a real-world estimate of other track materials delivery costs of $0.092 per ton-mile. CSXT further conservatively assumed that the TPIRR would use highly efficient bulk loading in 100-ton gondola cars.[202] CSXT's Track Engineering Experts used the resulting transportation price to calculate transportation costs for other track materials.[203]

iii. Derails and Wheel Stops

(a) Derails

CSXT's Track Engineering Experts accept TPI's proposed retractable derail for TPIRR yard locations, and its proposed unit price.[204] For mainline locations, however, CSXT's Track Engineering Experts reject TPI's proposed transportation distance. TPI failed to calculate an accurate average distance from TPIRR's double switch point derail supplier in Kansas City, KS to average railhead distance. CSXT Calculated and applied the average shipping distances in the "Mileage Matrix for Supplier" tab in CSXT Reply Workpaper "Track Construction CSXT Reply.xlsx."

(b) Wheel Stops

CSXT's Track Engineering Experts accept TPI's unit costs for wheel stops.

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[202] *See* CSXT Reply WP "Omaha Track Materials Omaha pickup for plates Whitehead Engi.txt."

[203] *See* CSXT Reply WP "OTM Transportation Cost Calculation.pdf."

[204] Derails "are used to keep cars from rolling from a spur track or side track through a turnout and onto the main track." *SunBelt*, STB Docket No. 42130, at 136.

iv. Crossing Diamonds

CSXT's Track Engineering Experts accept TPI's costs and quantities for crossing diamonds.

(a) Materials Transportation

Like TPI, CSXT largely has addressed the transportation costs for each item in the sections discussing the total cost for that item, so most transportation costs have been addressed above. In addition, CSXT's review of TPI's proposed railheads revealed that TPI's assumption that Nashville could function as a TPIRR construction railhead is unworkable. The Nashville railhead is designed to support track construction on the TPIRR Nashville and Louisville Divisions.[205] However, TPI assumed the TPIRR would replace CSXT on all of its lines into and out of Nashville. Moreover, the short line carriers that serve Nashville only connect to the CSXT lines that the TPIRR would replace. Thus, during construction of the TPIRR, there would be no existing rail lines available to transport track material to a railhead in Nashville. Consistent with *Otter Tail*, where the Board concluded that it would not be proper to assume that a SARR could transport materials over the very lines it would need to build, the TPIRR could not designate a railhead to receive materials from off-line rail transportation providers where no connections exist.

CSXT rejects TPI's assumption of a construction railhead at Nashville and has instead added four new railheads at the nearest connections to third-party rail service providers. These locations are: Elizabethtown, KY; Evansville, IN; Milan, TN; and Decatur, AL. Accordingly, CSXT has replaced the material transportation distances calculated by TPI to Nashville with the

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[205] *See* TPI Opening III-F-36 and TPI Op. WP "Track Construction.xlsx," Tab "Mileage Matrix."

average distances to these four railheads from TPI's selected suppliers.[206] CSXT calculated these distances using the most efficient rail route that does not traverse the segments of the CSXT network that the TPIRR is would replace. CSXT also used these locations instead of Nashville when determining ballast sources for the TPIRR and calculating associated transportation distances.[207]

(b) Track Construction Labor

CSXT's Track Engineering Experts accept TPI's costs for track construction labor.

4. Tunnels

CSXT tunnel design, engineering, and construction expert Roberto Guardia reviewed the tunnel section of TPI's evidence and developed this tunnel section of the CSXT reply. Mr. Guardia has extensive expertise in tunnel engineering and construction, as detailed in his qualifications in Section IV. Recently, Mr. Guardia was involved in the preparation of tunnel unit costs that were presented to the Board in the Norfolk Southern Reply Evidence of the *DuPont* rate case. CSXT accepts TPI's use of the tunnel lengths that it provided to TPI during discovery. However, TPI included in its inventory only 72 of the 74 tunnels on the TPIRR system. TPI excluded two tunnels in the inventory between Nashville and New Orleans of the 0BA line located at mile posts 250.78 and 272.19, known as Diana and Luda tunnels

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[206] This adjustment has relatively minor affects on TPIRR transportation costs for ballast, ties, OTM, anchors, and rail. *See* CSXT Reply WP "Track Construction Costs CSXT Reply," Tab "Mileage Matrix" cells J5 to J9.

[207] *See* CSXT Reply WP "Miles_Nashville_Alt_Railheads.png" and "Map_Nashville_Alt_Railheads.png."

respectively.[208] CSXT's Reply evidence adds the two missing tunnels (Diana and Luda), and makes corresponding corrections to TPI's tunnel cost estimate.[209]

CSXT accepts the cost per linear foot of tunnels that is based on Table III-F-19 of page III-F-166 in the Norfolk Southern Reply Evidence in *DuPont*, adjusted for inflation from 2Q09to 3Q10 levels. The table is missing unit costs for several l categories of tunnels in the TPI inventory that did not exist in the DuPont inventory. CSXT accepts the default category used in the TPI cost methodology that corresponds to the nearest shorter length tunnel unit cost. CSXT's revised Tunnels cost of $1,630 million is $34 million more than the cost of $1,596 million proposed by TPI.[210]

5. Bridges

TPI's bridge evidence, while correcting some of the flaws and errors that have characterized complainants' bridge evidence in prior cases, nonetheless contains a number of other errors that result in significant understatement of TPIRR bridge investment costs.[211] Thus,

[208] *See* CSXT Reply WP "Missing Tunnels.pdf."

[209] *See* CSXT Reply WP "TPI Tunnel Construction CSXT Reply," Tab "TPI Tunnel List," Lines 79 and 80.

[210] *Compare* CSXT Reply WP "TPI Tunnel Construction CSXT Reply" *with* TPI Open WP "TPI Tunnel Construction.xlsx."

[211] CSXT's Reply bridges analysis and evidence is developed and sponsored by David Magistro and Robert Phillips of STV, a firm offering engineering, architectural, planning, design, environmental, and construction management services for railroads, highways, and other infrastructure projects; and Michael Baranowski of FTI Consulting. Mr. Magistro is a Senior Engineer and Project Manager with STV and has over fourteen years of experience with structural designs, focusing on movable bridges and railroad structures. Mr. Phillips is Vice President of the Rail Division of STV and has over 35 years of experience in track design and maintenance, grade crossings, and construction management of rail projects. Mr. Phillips has also developed road property investment evidence in several prior SAC cases. Mr. Baranowski is a Senior Managing Director at FTI Consulting and has over thirty years of experience in transportation analysis. Further descriptions of these witnesses' experience and qualifications are set forth in Section IV *infra*. Messrs. Magistro, Phillips, and Baranowski are sometimes referred to collectively in this section as "CSXT's Bridge Engineering Experts."

TPI's unit costs for standard Type I, II, III and IV bridges are based on actual bridge construction projects and, with minor modifications, are generally representative of the costs the TPIRR would incur for such bridges. However, TPI's bridge inventories do not include a number of key bridges along the TPIRR route, including a number of areas where the TPIRR is assumed to construct multiple main line tracks. Further, TPI's evidence and assumptions for other categories of bridges (tall bridges, special non-movable bridges, oversized culverts, and movable bridges) is simplistic and significantly understates the cost of constructing those special structures.

One fundamental flaw that stands out from the others in TPI's bridge evidence is its reliance on the erroneous assumption that the TPIRR would be responsible for paying only 10% of the costs of constructing its movable bridges, an assumption the Board has squarely rejected. *See DuPont*, STB Docket No. 42125, at 223 ("The Board rejects DuPont's claim for cost reduction via the Truman-Hobbs Act and the American Recovery and Reinvestment Act of 2009 because the Truman-Hobbs Act applies only to the modification or relocation of bridges which are already in existence. The Truman-Hobbs Act does not provide funding assistance for the construction of brand new bridges such as the DRR would be constructing. Therefore, DuPont will be responsible for the full cost of movable bridges with no cost sharing arrangement."). This single erroneous assumption alone produces an understatement of TPIRR bridge costs of more than $1 billion. Overall, errors in TPI's development of TPIRR bridge investment costs resulted in understatement of necessary TPI investment by approximately $1.9 billion, as summarized in Table III-F-17 below.

Table III-F-17
Comparison of TPI Open and CSXT Reply TPIRR Bridge Investment Costs

	TPI Open	CSXT Reply	Difference
TPI Type I-IV Bridges	$1,286,882,362	$1,443,782,130	$156,899,768
TPI Mixed Spans	$145,306,500	$232,506,835	$87,200,335
Tall Bridges	$141,278,364	$209,308,090	$68,029,726
Special Non-Movable Bridges	$1,718,271,345	$2,011,809,541	$293,538,196
Oversized Culverts	$5,939,358	$83,857,805	$77,918,447
Movable Bridges	$140,227,588	$1,197,805,071	$1,057,577,483
Yard Bridges	$0	$91,482,815	$91,482,815
Highway Overpasses	$130,137,597	$228,494,408	$98,356,811
Total	**$3,568,043,114**	**$5,499,046,695**	**$1,931,003,581**

CSXT addresses each of these shortcomings in detail in the sections below, and provides details and supporting documentation for its reply calculations and analyses in its Reply workpapers.

a. Bridge Inventory

The bridge inventory TPI presented in its opening evidence requires several corrections in order to fairly and accurately represent the bridges that would be required to construct the TPIRR routes and system.

First, TPI omitted 18 Type I through IV bridges that the TPIRR must replicate and it also failed to account for moveable spans on two bridges, which TPI incorrectly classified as "Special Non-Movable Bridges" in its Opening Workpaper "TPI Bridge Construction Costs.xlsx," and costed as truss spans.[212] CSXT has corrected these omissions by adding the 18 missing bridges and adding the two excluded movable span bridges to the "TPI Special Movable Bridges"

[212] The misclassified movable bridge spans are on Bridge CFP 110.32 in the Baltimore Division and Bridge DC 28.1 on the Chicago Division. Bridge CFP 110.32 contains a swing span, and Bridge DC 28.1 contains a bascule span. *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Special Non-Movable Bridges," Lines 62 and 64 and CSXT Discovery File "2010 Active Bridges.xlsx," cells O4164 and O4316.

category.[213] CSXT also removed TPI's erroneous truss span cost for the two moveable bridge spans from the "Special Non-Movable Bridges" category and substituted the correct moveable bridge span costs.[214]

Second, TPI assigned an incorrect number of tracks to numerous bridges in several categories. CSXT first corrected track numbers to conform to those set forth in TPI's corresponding Stick Diagrams.[215] CSXT's Bridge Engineering Experts then adjusted the number of tracks to reflect track configuration changes dictated by CSXT's corrected reply operating plan.

Third, TPI included costs for a number of Types I through IV bridges the TPIRR would not be required to replicate because the bridges are owned by a railroad other than CSXT.[216] CSXT removed these bridges from the TPIRR bridge inventory by using a value of 0 (zero) in the "CSXT Corrected Number of Tracks" column used in CSXT's corrected bridge cost calculations.[217]

In addition to the Types I through IV bridge mis-classifications, TPI included one bridge in the "Special Non-Movable Bridges" category and two bridges in the "TPI Special Movable

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[213] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Type I-IV Bridge List," Lines 3940-3957; CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Special Movable Bridges," Lines 37 and 38.

[214] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Special Non-Movable Bridges," cells BF64 and BF66.

[215] The Stick Diagrams show, among other things, the number of tracks that would be necessary on each bridge according to TPI's own analysis and design. *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Type I-IV Bridge List, in Column AT," Tab "TPI Mixed Spans List, in Column AZ," Tab "Special Non-Movable Bridges, in Column BC," Tab "Oversized Culverts," in Column BV, and Tab "TPI Special Movable Bridges, Column AQ."

[216] *See* TPI Opening Stick Diagrams at 47, 78, and 109.

[217] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Type I-IV Bridge List" in Column AT and Tab "TPI Mixed Spans List" in Column AZ.

Bridges" category that the TPIRR would not be required to replicate because the bridges are located on lines over which the TPIRR would have trackage rights only.[218]

Fourth, TPI proposed to replicate 60 Type I through IV bridges using more spans than exist on the real world bridges. This directly contradicts TPI's fundamental assumption and approach to these standard bridges, which asserts that "[W]ater flow increase/decrease [in comparison to the existing CSXT bridges] is negligible due to the fact that, for each bridge, TPI's engineers either maintained the same number of spans and piers, or decreased the number of spans and piers, while keeping the length the same as the existing bridge. In this manner, the hydraulic opening of many bridges has been increased and improved by reducing the number of spans and bridge bents/piers." *See* TPI Opening III-F-40.

CSXT's objection to the layout approach for these 60 bridges is two-fold. For bridges over waterways, TPI's assertion that the "water flow increase/decrease is negligible" is itself negated where TPI proposes a bridge layout with more spans and piers than exists in the real world.[219] Such a material change, which makes the waterway channel more restricted, could be justified only if there is adequate engineering analysis to back it up. In order to support its increased number of spans for the same bridge length, TPI would have to demonstrate through a watershed run-off model or some other engineering analysis that the use of more piers would not create a rise in the existing water level. For bridges over roadways, the addition of piers is

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[218] *See* TPI Opening Stick Diagrams at 47, 78 and 109. CSXT removed these bridges from the TPIRR bridge inventory. *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Special Non-Movable Bridges," Line 119, and Tab "TPI Special Movable Bridges," on Lines 19 and 21.

[219] A corollary to TPI's statement is that where it increased the number of spans and piers, the increase/decrease in water flow is not negligible. TPI provided no analysis demonstrating that the waterway will be unhindered by additional piers. Therefore, TPI must maintain the same number or fewer piers on the replicated structures as exist on the actual CSXT bridges replicated by TPIRR.

equally flawed, but for a different reason. Most of the bridges in question are single span structures. If a single span structure crossing a roadway is replicated with a two-span structure where the two spans are equal in length, necessarily there would be a pier right in the middle of the roadway. Obviously, that would be unworkable.[220]

In the case of these 60 structures, CSXT's Bridge Engineering Experts analyzed the costs of correcting TPI's bridge layouts such that the number of spans and piers for the proposed structure matched the existing structure, as TPI's narrative claimed it had done. The results showed that the cost impact of such corrections would be negligible. Consider, as an example, Atlanta Division Bridge XXB 51.4 over US-29. The existing bridge is a 51-foot single span structure over the roadway. TPI proposed to replicate this bridge with two Type I spans, including a pier right in the middle of the roadway.[221] If TPI had consistently implemented the approach its opening narrative claimed to have applied, it would have replicated this bridge with a single Type III span. However, the cost of using a single Type III span on Type III abutments is actually very close to the cost of two Type I spans on Type I abutments when the cost of the pier is included.

The foregoing discussion is intended to ensure that CSXT's position is clear. The layouts TPI proposed for these 60 bridges are not acceptable, and TPI appears to have simply glossed over both its unsupported assumptions and the inconsistency of its re-design of those bridges with the approach TPI's narrative claims was used. However, because the cost impact of

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[220] *See, e.g.,* CSXT Reply WP "Atlanta Division Bridge XXB 51.4 over US-29.jpg."

[221] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "TPI Type I-IV Bridge List," Line 3808.

correcting the layouts is small, CSXT's Reply did not alter the layout of this relatively small number of bridges.[222]

After CSXT's Bridge Engineering Experts corrected the various errors in TPI's proposed inventory of Types I through IV bridges, it transferred corrected bridge data to four new tabs, one for each of the Type I, Type II, Type III and Type IV Bridges.[223] This reorganization simplifies corrections that had to be made to one of these standard bridge classifications that did not apply to the other standard bridge classifications. After breaking out the four standard bridge type classifications onto separate tabs on CSXT's bridge cost spreadsheet, CSXT's Bridge Engineering Experts made all subsequent corrections to quantities and/or costs for any Type I through IV bridge inside the spreadsheet tab for the corresponding bridge type.[224]

In the case of TPI's mixed span bridges, all corrections to both inventory and costs are made in the original tab.[225]

The corrections discussed above are made in new columns and rows so that all of TPI's opening data and costs evidence is preserved for easy reference.

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[222] In every case where CSXT has made a correction to TPI's proposed inventory, CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx" contains highlighted cells with explanatory notes and references.

[223] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Type I-IV Bridge List."

[224] For example, consider Nashville Division Bridge 000 6.8 on the Louisville Terminal, as shown in CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx" on Tab "TPI Type I-IV Bridge List," Line 20. CSXT makes an inventory correction in Column AT of that tab and references the source of the correction in Column AU of that same tab. Since TPI opted to replicate this bridge as a standard Type II bridge, CSXT transferred the corrected bridge data to the "Type II Bridges" tab of the same workpaper file. On that tab, CSXT made appropriate corrections to the costs as shown in Columns AO-AS.

[225] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Mixed Spans List," Columns AZ-BK.

b. Bridge Design and Costs

<u>Overview</u>

CSXT has accepted the majority of the design elements associated with the standard Types I though Type IV bridges posited by TPI, and made minor corrections where necessary. In contrast, CSXT identified numerous and significant errors in TPI's design criteria for non-standard bridges and a number of corrections were necessary to accurately reflect the real-world cost of those special bridges. The corrections and adjustments made by CSXT's Bridge Engineering Experts are described below in each bridge category's respective section.

CSXT accepts that the majority of unit prices TPI used to calculate costs for bridges on the TPIRR are accurate where and to the extent they apply, meaning the costs are derived from actual contractors' bids on selected railroad projects. After making minor corrections that will be discussed in the sections that follow, TPI's unit prices may be deemed reasonable. However, TPI's application of those unit prices requires correction.

All of the unit prices that TPI used as the basis for its cost calculations on Types I through IV bridges and mixed span bridges came from projects in just two states, Alabama and Tennessee.[226] As discussed below, this selective use of bridge costs from those low-cost areas to extrapolate costs for the entire geographically extensive TPIRR system resulted in a significant understatement of investment costs for TPIRR bridges.[227]

R.S. Means, a resource repeatedly accepted by the Board for a variety of road property investment costs and data in SAC cases, uses construction cost data from all over the country to compile City Cost Indices and Location Factor values. *See, e.g., DuPont*, STB 42125, at 220.

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[226] *See* CSXT Reply WP "TPI Unit Price List.pdf."

[227] The R.S. Means State Location Factor for each of those two States, based on R.S. Means City Cost Index data, is significantly lower than the average of all the States traversed by the TPIRR. *See* CSXT Reply WP "State Location Factors.pdf."

This data accounts for regional differences in the cost of material and labor, due largely to the differences in the economies of various cities and states. The R.S. Means Location Factor values can be applied to derive the cost of similar projects in different states and locations by applying these various indices. The following is a simplified example. The State Location Factor for Alabama is 79.9, and the State Location Factor for Illinois is 104.6. If a project costs $100,000 in Alabama, R.S. Means data suggests that the exact same project would cost approximately $130,914 in the state of Illinois. This cost comes from applying the ratio of the Location Factor for the desired location (here, Illinois) to the Location Factor for the location of the cost source (here, Alabama) and multiplying that ratio by the cost from the source location (Alabama). Thus, in the example, $100,000 x (104.6/79.9) = $130,914.

As the foregoing example illustrates, by using unit prices from just two states, whose Location Factors are lower than the average state location factor for all of the states where the TPIRR runs, TPI has significantly understated the cost of the bridge inventory on the TPIRR. Indeed CSXT Reply WP "TPI Unit Price List.pdf" demonstrates that the majority of TPI's unit prices come from a single state, Tennessee. Further, eight of TPI's ten unit prices that came from the state of Alabama are for relatively small cost items, such as pile tips. *See id.* Thus, TPI's opening bridge construction costs more accurately reflect the cost to build all of its bridges in the state of Tennessee, rather than over the entire route of the TPIRR. This significant error must be corrected in order to fairly and accurately estimate bridge construction costs over the entire TPIRR.

CSXT corrected the application of unit prices to the bridge inventory using a two-step process. The first step was to index the few unit prices that came from a project in Alabama to the state of Tennessee levels, using the R.S. Means State Location Factors for the two states.

The reason that this indexing is required is that some of TPI's unit prices for the same type of bridge come from two different states. For example, TPI's Type I bridges rely on unit costs from a project in Alabama for the superstructure beams, elastomeric bearing pads and pile tips, but all other components have unit prices that come from a project in Tennessee. By combining unit prices in this manner, TPI erroneously assumed that a contractor that quoted a price for superstructure beams, bearing pads, and pile tips in Alabama would quote the exact same price to furnish and install those same materials in all of the other states traversed by the TPIRR. As the R.S. Means data shows, that assumption is wrong.[228] TPI attempted to mix apples and oranges when it compiled unit costs from different states for a single bridge. CSXT's correction of the unit prices by indexing them to a common location allows for the unit costs to be compiled for a given bridge on an apples-to-apples basis.[229]

This allows for the use of Tennessee's State Location Factor as the basis for the costs of all bridges in the second step.[230] That second step in CSXT's corrected application of unit costs is simply to multiply the cost for each bridge by the ratio of the State Location Factor for the state of that bridge to the State Location Factor for Tennessee [Bridge Cost x (Bridge location factor/Reference location factor)].[231]

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[228] *See* CSXT Reply WP "RS Means Location Factor Description.PDF."

[229] As discussed previously, the vast majority of unit pricing information comes from projects in the state of Tennessee, and a very small portion from projects in the state of Alabama. In order to index all of the unit costs to a common location, it makes sense to adjust the unit prices from Alabama to Tennessee.

[230] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Tall Bridges" cells L28, L33, L38 and L44; Tab "Abut. Pile Tips," at cells C32, D32 and F32; Tab "Pier Pile Tips," at cell C31, Tab "Superstructure Type I," at cell C36; Tab "Type I Elastomeric Pad," cell C32; and Tab "Superstructure Type IV," cell E20.

[231] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Type I Bridges," in Column AT; Tab "Type II Bridges," Column AS; Tab "Type III Bridges," Column AS; Tab "Type IV Bridges," Column AQ; Tab "TPI Mixed Spans List," in Column BK; Tab

The application of location factors is neither new nor revolutionary. Instead, it is standard practice to apply a location index or adjustment when using actual bridge construction costs from one location to estimate the costs of a similar bridge construction project in another location. A railroad bridge owner would absolutely take this into account when estimating the cost of a bridge project. That is, a person wishing to estimate the construction cost of a bridge would find a very similar previous bridge project wherever it might be located, and if that bridge were in a location with materially different costs, the person estimating the cost of the new bridge would make cost adjustments to account for those costs that vary from the source location to the different location in which the new bridge would be constructed. For example, transportation costs for getting material to the site would be more or less, but not the same and labor costs would be more or less, but not the same. Moreover, this common sense adjustment is consistent with Board precedent. Recently, in *DuPont*, the Board found such an adjustment reasonable and appropriate, explaining, "[the Board] will add NS cost adjustments based on location because, as noted in reference to highway overpasses, such adjustments reflect the correct location and associated costs to be applied to local construction. … NS's inclusion of a *Means* cost location factor represents the best evidence of record for accounting for geographical construction costs . . ." *See DuPont*, STB Docket No. 42125, at 220.

CSXT's Bridge Engineering Experts applied location factors to adjust the costs of each bridge to account for its location on the TPIRR for all categories of bridges except for the Movable Bridge classification. Movable bridges are such unique structures, as demonstrated by the paucity of available cost data, that R.S. Means location factor data reasonably cannot be applied to their construction costs. Apparently recognizing the unique nature of moveable

"Tall Bridges," Column AX; Tab "Special Non-Movable Bridges," Column CI; and Tab "Oversized Culverts," in Column CQ.

bridges, TPI did not attempt to apply a single of location-specific railroad construction unit prices to them. The reason that these bridges are so unique is that they are essentially very large, complex machines. Their design is complex, the electrical and mechanical equipment they contain is complex, and their construction is certainly complex. Building a movable bridge requires specialized equipment and personnel that are not commonly found in every state. For example, specialized millwrights are employed to oversee installation of mechanical equipment, and then to inspect and test the equipment after installation. Systems integrators are used to tie in the electrical controls of all of the various pieces of electrical equipment to ensure operational redundancy and safety interlocking. Registered professional engineers are typically used for construction management and project oversight in lieu of less skilled inspectors. Because of these and other significant variables, it is impossible to accurately project construction costs for a movable bridge in one location based solely on the construction cost of a similar structure in another location.

i. Type I Bridges

TPI assumed that TPIRR Type I bridges would have varying span lengths up to 32'-0". CSXT accepts the design of this standard bridge type and the source of unit prices used by TPI to calculate the cost of these Type I Bridges. CSXT's Bridge Engineering Experts have applied Location Factors to calculate appropriate unit prices for Type I bridges, as discussed above.[232]

ii. Type II Bridges

Type II bridges are assumed by TPI to have spans of 32'-0" to 45'-0." TPI's case-in-chief made errors in both the design and unit prices used to calculate costs of Type II Bridges. In

[232] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tap "Type I Bridges," cells AW2-AY20 and Column AT.

addition to the corrections detailed below, CSXT has applied location factors to the corrected unit prices for Type II bridges, as discussed previously.[233]

The Type II Bridge superstructure proposed by TPI is not sufficiently robust to meet AREMA deflection criteria. Although TPI's workpaper calculation for Type II bridge superstructures indicates that the deflection is 0.775 inches, which is below the maximum allowable value established by AREMA of 0.844 inches, a review of TPI's calculation reveals that TPI made a considerable number of errors. The cumulative effect of all of those errors is significant. After correcting the errors, the CSXT's Bridge Engineering Experts calculated deflection to be 0.936 inches, which is greater than the allowable 0.844 inches value established by AREMA.[234]

Most significantly, CSXT's Bridge Engineering Experts had to make corrections to the Type II Bridge calculations furnished by TPI in its workpapers because TPI inexplicably used an indirect approach to approximate the deflection of the beams. An approximate approach should be used only if there is some parameter of the live load axle configuration that is unknown. However, the actual axle configuration of the live load is known, and in fact, TPI even shows the axle configuration in a diagram in its workpapers.[235] The deflection can be calculated easily using the given axle loads and axle spacing for the Alternate Load without having to approximate anything. Interestingly, when the actual axle load and axle spacing are used to calculate beam deflection in lieu of TPI's proffered approximation, the resulting beam deflection exceeds AREMA's allowable value. After properly calculating the beam deflection, CSXT's

[233] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Type II Bridges," cells AV2-AX20 and Column AS.

[234] *See* CSXT Reply WP "Type II Bridge Beam Deflection.pdf."

[235] *See* TPI Op. WP "Type II Bridge Calcs 45 ft Span.pdf," at 2 (where it shows "Cooper E-80 Alternate Loading.").

Bridge Engineering Experts determined that the beam size of the Type II bridge superstructure needed to be increased from the W40x215 size specified by TPI to W40x249 in order to meet AREMA deflection criteria.[236]

TPI also erred in applying unit price data for both the elastomeric bearing pads and steel base plates for Type II Bridges. CSXT accepts the actual unit prices referenced in the workpapers, but the method of applying them to derive the cost of a Type II span requires correction.[237] The source of the errors can be traced to TPI's rigid adherence to its practice of selecting only the lowest possible unit price it could find, regardless of whether the resulting cost items would work with one another or were even for the same type of structure. As a result of this blinkered approach, TPI ended up with a confused and convoluted list of workpapers and unit pricing citations that were difficult to follow or connect to the corresponding individual components. In a number of critical areas, TPI itself applied unit prices that were quoted for a Type III bridge to the components of a Type II Bridge. For example, the references TPI cited for the unit prices for Type II Bridge elastomeric bearing pads and steel base plates are workpapers "Green Contractors – Type II Elastomeric Pad.pdf" and "Green Contractors – Type II Steel Base PL.pdf," respectively. Both files are copies of the exact same bid sheet, which is for construction of a Tennessee Southern Railroad Authority bridge at Milepost 257.9 of that railroad. The set of bridge plans contained in TPI Workpaper "Type III_Photos and Plans.pdf" is for the very same bridge. Those plans clearly show that Bridge 257.9 would be categorized as a Type III (not Type II) Bridge under TPI's classification system.

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[236] *See id.*

[237] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Type II Elastomeric Pad," Cell D8 and Tab "Type II Steel Base PL," Cell D8.

To estimate the Type II elastomeric bearing pad, TPI divided a bid price by three, as it claims the quote was a lump-sum bid price for a 3-span bridge. But the lump-sum bid price of $3,802.75 that TPI referenced is neither described nor documented in any workpaper provided in its opening evidence. It certainly doesn't match the total bid price of $6,400 shown for elastomeric bearing pads in the cited workpaper. Instead, TPI Opening Workpaper "Green Contractors – Type II Elastomeric Pad.pdf" clearly shows the bearing pads priced individually on a cost per pad basis. CSXT's Bridge Engineering Experts took the quoted price per pad and multiplied that by eight to get a price for the bearing pads on a per-span basis, because there are four beams per span with a bearing pad at each end of each beam. When CSXT's Bridge Engineering Experts correctly applied the unit price, the cost per span for bearing pads on the Type II Bridge increased from TPI's value of $1,300.91 to CSXT's corrected value of $2,346.92, a substantial increase.[238]

In the case of the Type II steel base plates, TPI's error in applying the unit price quote it obtained was a little different, but equally baffling. TPI obtained a bid price quote for base plates, and produced a copy of that price quote in materials it provided in "support" of its TPIRR base plate cost calculations.[239] But TPI failed to apply that price in computing the corresponding costs for that component of relevant TPIRR bridges. Instead, TPI's spreadsheet calculations of Type II bridge base plate costs used an entirely different unit price that not only does not match the price quote TPI produced and purported to rely upon, but also is otherwise wholly unsupported by real world cost evidence.[240] When CSXT's Bridge Engineering Experts

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[238] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Type II Elastomeric Pad," cells C19 and D19.

[239] *See* TPI Op. WP "Greene Contractors – Type II Steel Base PL.pdf."

[240] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Type II Steel Base PL."

reviewed the bid sheet that was furnished with TPI's evidence, it was simple to calculate the cost per base plate from the quoted unit price to compute the correct base plates cost corresponding to that quoted unit price. The bid sheet provided by TPI showed a total price for bearing plates, and clearly identified the subject bridge as Tennessee Southern Railroad Authority Bridge 257.9 A-Line. TPI's workpapers show plan sheets for this bridge, which readily show the bridge has a total of 32 base plates.[241] CSXT's Bridge Engineering Experts simply divided the total price quoted by 32 to arrive at a price per bearing plate. Finally, they multiplied that value by eight to get a price for the bearing plates on a per-span basis, because there are four beams per span with a bearing plate at each end of each beam.

CSXT's Bridge Engineering Experts corrected TPI's unit prices and applied the corrected prices to the bridge cost spreadsheet.[242] All corrections CSXT's Bridge Engineering Experts made to the bridge cost spreadsheet are highlighted and annotated in their workpapers for clarity and ease of reference.

iii. Type III Bridges

TPI assumed that Type III bridges would have spans ranging from 60'-0" to 92'-6". CSXT accepts TPI's design of this standard bridge type and the source of unit prices used by TPI

[241] *See* TPI Op. WP "Type III_Photos and Plans.pdf," Sheet 8, Line 11 of the table titled "Work by Contractor."

[242] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Type II Bridges," Column AO for the corrected price of Type II Bridge superstructures based on corrected steel quantities required due to the errors in TPI's beam deflection calculation; CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tabs "Type II Elastomeric Pad" and "Type II Steel Base PL" for details of the corrections that were made to the unit prices for Type II Bridge bearing pads and steel base plates.

to calculate the cost of these Type III Bridges. Location factors have been added to the unit costs for Type III bridges, as discussed above.[243]

iv. Type IV Bridges

TPI's Type IV bridges to have spans of up to 150 feet in length and use through-plate girders. TPI further assumed that Type IV bridges may be combined with other types of TPIRR bridges and be used to cross larger rivers, and in other instances in which a longer span would be more cost effective than multiple shorter spans. CSXT accepts TPI's design of the Type IV Bridge superstructure. CSXT applies location factors to the unit prices for the Type IV Bridge as discussed above. In addition, the unit price TPI used to calculate steel costs for the Type IV Bridge superstructure is unsupported. CSXT rejects TPI's unsupported unit price for steel through-plate girders used to generate the cost for the Type IV Bridge superstructure, and substitutes a reasonable and supported unit price. Additionally, location factors have been added to the costs for Type IV bridges, as discussed above.[244]

TPI's sole "support" for its proposed unit price of Type IV Bridge superstructure steel is an interoffice e-mail between several of TPI's own engineers. There is no document showing that any contractor or supplier actually bid the amount TPI proposed, and TPI provided no other documentary support or evidence to show that the unit price it proffered actually applies to the relevant quantity of steel.[245] In sum, TPI has failed to provide evidence sufficient to support its proposed steel through-plate girder unit price.

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[243] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Type III Bridges," Column AS and cells AV2-AX20.

[244] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Type IV Bridges," Column AQ and cells AT2-AV20.

[245] *See* TPI Op. WP "NERA- Superstructure Type IV.pdf."

On Reply, CSXT's Bridge Engineering Experts identified publicly available actual contractor bids for railroad through-plate girders of the type used in TPI's Type IV Bridge superstructures. They time-adjusted those available bid amounts to the TPIRR construction period to derive a least-cost unit price for steel to be used for Type IV Bridge superstructures.[246]

In addition, while CSXT accepts TPI's design for Type IV Abutments, as well as the unit price data used to calculate costs for components of those abutments, it rejects TPI's erroneous computation of component quantities for the Type IV abutment. TPI calculated the unit cost of a Type IV abutment based on the use of 10 steel piles.[247] However, the details that TPI used as a basis for the quantities of this abutment clearly show the use of 12 piles.[248] The additional two piles are required to support the wingwalls. If TPI had intended to exclude those two piles, it would be required to provide calculations or other evidence to demonstrate the wingwalls would be stable without pile supports. TPI provided no such evidence. Therefore, because TPI used a previously designed bridge abutment in lieu of developing a new design from scratch, it must account for the number of piles used in the construction of its prototype abutment design. CSXT's Bridge Engineering Experts corrected TPI's error in developing the Type IV Abutment component quantities and resulting costs.[249]

v. Bridges with Mixed Spans

TPI removed bridges with mixed spans from the TPIRR standard bridge list and calculated costs for these bridges separately. CSXT accepts TPI's rationale for creating a

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[246] *See* CSXT Reply WPs "Type IV Bridge Steel Unit Price.pdf" and "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Superstructure Type IV."

[247] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Abutment Piles," cell J6.

[248] *See* TPI Op. WP "Type IV_Plans and Photos.pdf," at 58.

[249] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tabs "Abutment Piles" in Column K, "Abut. Pile Tips" in Column F and "Combined Bridge Component Costs" in cells F21 and F22.

category of bridges made up of different standard bridge types. However, TPI's bridges with mixed spans incorporate the same errors that CSXT discussed above for Type II and Type IV spans, and for Type IV abutments, to the extent a mixed span bridge utilize those components. CSXT's Reply Evidence corrects those errors.[250] Additionally, location factors have been added to the costs for Mixed Span bridges, as discussed above.[251]

TPI also made a fundamental error in its calculation of superstructure costs for mixed-span bridges. TPI derived the total cost of the standard Type I through Type IV bridge superstructure spans as a combination of two different cost components: 1) fixed cost per span, and 2) variable cost per foot of the bridge times its length.[252] CSXT accepts this general costing methodology for the TPIRR Type I through Type IV bridges. However, in its cost calculations for the mixed span bridges,[253] TPI inexplicably included only the variable cost-per-foot component and ignored the fixed cost per span. *See id.* This error is uniform throughout TPI's mixed span bridge superstructure cost calculations for each span type. The formulas in the columns that calculate the superstructure cost for each span type refer back to Tab "Combined Bridge Component Costs" in the same workpaper file, which is where TPI's calculated variable cost-per-foot and cost per span are shown for each bridge type. However, formulas in these columns only include the respective cost-per-foot value for each respective type of bridge

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[250] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Mixed Spans List," Columns AZ-BK.

[251] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Type III Bridges," Column BK and Cells BN2-BP20.

[252] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Combined Bridge Component Costs."

[253] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "TPI Mixed Spans List."

superstructure and fail to add in its fixed cost per span. CSXT's Reply corrects this error by including both necessary components of mixed-span bridge costs on Reply.[254]

vi. Tall Bridges

TPI classified bridges with clearances of 65'-0" or greater as "tall bridges." TPI's proposed parameters for TPIRR tall bridges require a number of significant corrections to both design and the cost development in order to meet the requirements of the bridges the TPIRR would replace. The majority of deficiencies in TPI's design and construction cost evidence for tall bridges are concentrated in the design, quantities, and costs of steel towers used to support the superstructures for those bridges. Additionally, as with other bridge type classifications, location factors have been added to the costs for tall bridges, as discussed above.[255]

TPI proposed to use a steel tower from an existing bridge as the basis of and template for its design and quantities for the tall steel towers on TPIRR bridges.[256] According to TPI's Opening Workpaper "Pitman Creek Bridge MP 163.4.pdf," the bridge on which TPI based its TPIRR tall bridge design, was itself designed for the CNO&TP Railway in 1907. The bridge has four piers, two of which are made up of concrete and two of which are made up of steel. TPI used the taller of these two steel towers, which provides a clearance of 55 feet, as the basis for the design and quantities for the steel towers supporting the "tall bridges" on the TPIRR. CSXT does not object to TPI's use of an existing structure as a template or prototype for its bridge elements on the TPIRR in lieu of performing a new design from scratch. However, necessary

[254] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Mixed Spans List," Columns BB-BD. The corrections have been highlighted and annotated for ready reference.

[255] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Tall Bridges," cells L28-L44, Column AX and cells BA2-BC20.

[256] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Tall Bridges," Line 25.

adjustments must be made to the design, parameters, and quantities of the prototype structure when it is translated to the specific bridges the TPIRR would be required to replace, in order to develop accurate, feasible costs for those bridges.

TPI calculated the total steel weight used to build the example tower and divided that weight by the height of the tower, generating a weight of steel per foot of height for the steel tower. TPI then multiplied the calculated weight per foot of steel by the height of the bridge towers they are replicating on the TPIRR:

[Lbs. of steel exist. tower] ÷ [Height of exist. tower] = Lbs. of steel per ft. of tower

[Lbs. of steel per ft. of tower] x [Height of TPI Bridge] = Lbs. of steel on TPI bridge

This approach may seem straight-forward, but unfortunately—even if TPI's calculations had actually implemented this approach—it would substantially understate the amount of steel required for tall bridges with clearances greater than the clearances provided by TPI's example steel tower.

The first deficiency in TPI's tall bridge evidence is that its calculation of the weight of steel that makes up the example steel tower contains errors. TPI made a number of arithmetic errors in its weight computations. In addition, TPI also omitted a number of steel members that are clearly shown in the plan set for the example bridge. CSXT's Bridge Engineering Experts corrected the arithmetic errors and added in the bracing members that were omitted by TPI, as detailed in CSXT Reply Workpaper "Steel Tower Weight Correction.pdf."

In addition to TPI's errors in the steel tower weight calculation, there is a more fundamental problem with the way that TPI extrapolated data for tall bridges that resulted in the understatement of tall bridge construction costs. The particular steel tower that TPI selected as its template for the tall bridges on the TPIRR has a clearance of only 55 feet, which TPI acknowledges on Page 1 of its opening workpaper "Pitman Creek Bridge Viaduct #2 Steel Weight.pdf." TPI's own definition of tall bridges is any bridge with a clearance greater than 65 feet. *See* TPI Opening III-F-44. The TPIRR tall bridges have clearances that range from 67-feet all the way up to 125-feet, which substantially exceeds the 55-foot clearance of the bridge TPI used as its template.[257] TPI's workpaper shows that TPI used its calculated weight per foot of steel derived from a tower with a clearance of just 55-feet to estimate the weight of steel towers much taller than the example tower. *See id.*

If TPI had attempted to apply this "unit weight" of steel to bridge towers that had clearances equal to or less than the example steel tower, that would have been acceptable. However, using the same approach to apply the calculated "unit weight" of steel to bridge towers with clearances *greater*—and in many cases, far greater—than the template tower is not feasible. TPI cannot simply "stretch" the template steel tower to whatever height it desires. TPI performed no calculations to determine whether the design of the weight per foot of the example steel tower would be capable of withstanding the greater loads imposed upon a steel tower that is substantially taller.

An example helps to illustrate the engineering principles involved. Suppose a 2x4 piece of lumber that is ten feet long standing on-end (the "example tower") can support a weight of 600 pounds before it fails or "buckles." A structural engineer can positively assert that the same type of 2x4 piece of lumber that is only five feet long standing on-end (shorter than the "example tower") could also support a weight of 600 pounds. However, the structural engineer *cannot* assert that a similar 2x4 piece of lumber that is 20 feet long (taller than the "example tower") could also support a weight of 600 pounds. While it is possible that the taller lumber could

[257] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Tall bridges," Column Q.

potentially support the same weight, an engineer cannot confidently posit that to be the case without performing necessary engineering calculations. Without such engineering analysis, there is no way to know how much weight that lumber can support at the taller height.

The principles that allow a structural engineer to positively assert the shorter member can support the same weight, but a taller member cannot are the "slenderness ratio" and "column buckling" theory.[258] Everything else being held equal, as the height of a tower increases, its load-bearing capacity decreases. When TPI proposes to simply "stretch" the steel tower that was designed for a clearance of 55-feet up to a height that provides a clearance of 125-feet, it is increasing the slenderness ratio substantially, and thereby reducing the load capacity of the steel tower. Therefore, TPI's approach to replicating these tall steel towers is not only inaccurate; it is also dangerously reckless from an engineering point of view. The steel tower capacity required for taller bridge heights must be calculated using actual engineering analysis, but TPI's evidence included no such analysis or support.

CSXT's Bridge Engineering Experts performed the calculations and analysis required to determine whether and to what extent the height of TPI's example steel tower could be "stretched" beyond the 55-foot clearance it was designed for before the applied load would exceed its allowable load. The analysis demonstrated that the example steel tower could be increased to provide a clearance of approximately 75-feet without requiring modifications to the steel tower dimensions. CSXT's Bridge Engineering Experts used a stronger material, 50-ksi steel, in their analysis than the lower strength steel that TPI's example tower would have been used. TPI's Opening Workpaper "Pitman Creek Bridge MP 163.4.pdf" does not specify the strength of the steel material actually used in its template steel tower construction, but structural

[258] *See* CSXT Reply WP "Slenderness Ratio Explanation.pdf" (showing the mathematical formulae that prove the 2x4 example in the text).

steel typically produced around the turn of the last century was commonly Open Hearth Steel, which equates to approximately 30-ksi steel. This difference in material strength is part of the reason that the tower height can be increased to provide 75 feet of clearance without having to modify its member sizes or other parameters. In addition, the original design of the steel tower had some reserve capacity. But there is no way to determine (let alone prove) that without performing an engineering analysis.[259] TPI performed no such analysis and thus failed to meet its burden of proof regarding the structural feasibility and adequacy of its tower design and quantities. Based on the analysis CSXT's Bridge Engineering Experts did perform, CSXT utilized the steel tower proposed by TPI for "tall bridges" with clearances up to 75-feet, after making the corrections to the steel weight calculations discussed above.[260]

For the remaining bridges in the tall bridges category, which have clearances from 75 to 125 feet, CSXT's Bridge Engineering Experts performed the necessary analyses to determine what modifications need to be made to the steel tower details from the example tower in order for them to be stable and have sufficient load capacity to support the loads imposed upon them at the taller heights. Using the details from the existing steel tower as a starting point, the most efficient adjustment to increase its load capacity for use at taller heights was to increase the size of the four columns of the towers. Using this approach, the various bracing members and struts did not have to be changed substantially. Based on this analysis, CSXT developed corrected steel quantities for Tall Bridges with clearances taller than 75 feet.[261]

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[259] *See* CSXT Reply WP "75 Foot Tall Steel Towers.pdf."

[260] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Tall Bridges," cells M25-M28.

[261] *See* CSXT Reply WP "125 Foot Tall Steel Towers.pdf," Page 251 of 251 and "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Tall Bridges," cells M30-M33 and Column AU.

In addition to correcting the design of the tall steel towers and the quantities associated with them, CSXT's Bridge Engineering Experts made a number of additional necessary corrections to TPI's opening evidence for this classification of bridges. Where TPI's tall bridges included Type II and Type IV spans, those spans were corrected as previously discussed. Those corrections included Type II Bridge superstructure beam size, unit prices for Type II Bridge bearing pads and bearing plates, adjustment for the unit price of the steel in the Type IV through plate girders and total price for Type IV abutments.[262]

TPI's tall bridge cost calculations also contain the same error identified for Mixed Span Bridges, whereby the superstructure span costs included only calculated variable costs-per-foot of the spans, and excluded the fixed cost per span.[263] The formulas in these columns refer back to Tab "Combined Bridge Component Costs" in the same workpaper file, which is where TPI's calculated variable cost-per-foot and cost per span are shown for each bridge type. However, formulas in these columns only include the respective cost-per-foot value for each respective type of bridge superstructure and fail to add its fixed cost per span. CSXT's Bridge Engineering Experts corrected these calculations to include both aspects of the bridge superstructure cost.[264]

There was yet another substantial error in TPI's tall bridge evidence that required correction. For the unit price of steel, TPI utilized a price quote from 2Q06 for the steel in the towers. 2Q06 was the date of the unit price quote, but TPI failed to adjust that unit price to the

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[262] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Tall Bridges," Columns AO, AQ, and AT.

[263] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Tall Bridges," Columns AA, AB, AC and AD.

[264] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Tall Bridges," Columns AN-AQ.

3Q10 time period when the TPIRR would be constructed. CSXT's Bridge Engineering Experts corrected this error so that the unit price reflected for the correct time period.[265]

The corrections that CSXT's Bridge Engineering Experts made to TPI's tall bridge evidence and calculations are highlighted and annotated in CSXT Reply Workpaper "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Tall Bridges."

vii. Special Non-Movable Bridges

Although not discussed in TPI's opening narrative, TPI's bridge construction cost workpapers include a separate spreadsheet tab for Special Non-Movable Bridges.[266] This category of structures generally includes bridges with truss spans that cannot be replicated with the shorter Types I through IV standard bridges.[267] CSXT does not object to creating such a separate, special class of bridges. However, as with TPI's other classifications of bridges, its Special Non-Movable Bridges evidence contains a number of design and cost errors that must be corrected before the construction costs for these bridges bears any resemblance to reality. Several of CSXT's corrections to the Special Non-Movable Bridges are similar to those it identified for Tall Bridges. In addition, there are also a number of deficiencies in TPI's evidence that are unique to the Special Non-Moveable Bridges.

<u>First</u>, two bridges within TPI's Special Non-Movable Bridges category are miscategorized because they contain a movable span. Namely, Bridge CFP 110.32 on the Baltimore Division contains a swing span, and Bridge DC 28.1 on the Chicago Division contains

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[265] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Tall Bridges," cell M26.

[266] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Special Non-Movable Bridges."

[267] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Special Non-Movable Bridges," Column C where TPI identified the unique aspect of each of those bridges that disqualifies it from being categorized as one of the standard bridge types.

a bascule span.[268] TPI proposed truss spans rather than the necessary movable spans for these two bridges. CSXT's Bridge Engineering Experts removed the truss span cost from the "Special Non-Movable Bridges" tab for these two bridges and added movable span costs for these two bridges to the "TPI Special Movable Bridges" tab.[269]

Second, there are also two bridges within the Special Non-Movable Bridges category that have a substantially different clearance than TPI assigned to them. Specifically, TPI assigned a clearance of just 18 feet to Bridge CFP 89.7 on the Baltimore Division,[270] but the actual clearance of that bridge is 65 feet.[271] And the clearance TPI assigned to Bridge QR 86.57 on the Albany Division was just 14 feet.[272] However, this bridge has an actual clearance of 144 feet.[273] CSXT's Bridge Engineering Experts corrected the substructure costs for both of these bridges to account for the taller towers that are required to provide the actual clearance to be replicated.[274]

Third, there are a number of TPI's Special Non-Movable Bridges that have very high clearances, and failed to account for those heights in a realistic and feasible manner.[275] TPI proposed to replace these structures based on the same design and quantities from the example steel tower it posited for tall bridges. For reasons discussed in the Tall Bridges section, the same

268 *See* CSXT Discovery File "2010 Active Bridges.xlsx," Cells O4164 and O4316.

269 *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Special Movable Bridges," Lines 37 and 38.

270 *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Special non-Movable Bridges," cell Y62.

271 *See* CSXT Reply WP "Baltimore RF&P CFP 89.70 Exhibit.pdf."

272 *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Special non-Movable Bridges," cell Y93.

273 *See* CSXT Reply WP "Albany River QR 86.57 Exhibit.pdf."

274 *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Special Non-Movable Bridges" at cells BE65 and BE95.

275 *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Special Non-Movable Bridges," cells Y85, Y104-Y106, Y109 and Y111-Y114.

corrections need to be made for these steel tower structures in the special Non-Moveable Bridges category. Specifically, the steel towers for 11 bridge locations, as proposed by TPI, would not have the capacity to withstand the loads imposed upon them at clearances exceeding 75-feet tall. To address this deficiency, CSXT's Bridge Engineering Experts used the design and quantities developed in CSXT Reply Workpaper "125 Foot Tall Steel Towers.pdf", (increasing column sizes to provide capacity to bear the relevant loads) to calculate the steel tower cost for TPI's 11 bridges categorized as "Special Non-Movable Bridges" with clearances up to 125 feet.

TPI's undersized support tower error is more egregious for these Special Non-Movable Bridges that have greater clearances than any bridge in the Tall Bridges category: Great Lakes Bridge QDS 11.09 has a clearance of 140 feet (TPI Op. WP "TPI Bridge Construction Costs.xlsx, Tab Special Non-Movable Bridges, cell Y85), Nashville Bridge 000 367.2 has a clearance of 168 feet (cell Y106) and Nashville Bridge 00H 210.1 has a clearance of 221 feet (cell Y111). It is remarkable that TPI would propose to replicate a bridge with 221 feet of clearance with a steel tower designed for a clearance of just 55 feet. This is utterly infeasible. CSXT's Bridge Engineering Experts analyzed these bridges and determined the extent to which TPI's steel tower parameters had to be modified to be stable and provide adequate load capacity to withstand the loads imposed upon them at the actual heights of those bridges.[276]

In addition to the issue of tower height, TPI's construction costs for the steel towers in this category contain the same errors as are found in the steel towers for the Tall Bridge category. Specifically, TPI included errors in the calculation of weight per foot of steel in the example steel tower and the unit price adjustment for the proper time period.

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[276] *See* CSXT Reply WPs "168 Foot Tall Steel Towers.pdf" and "221 Foot Tall Steel Towers.pdf."

Using the same methods, CSXT corrected these errors in the tall bridge steel costs and quantities. *See supra* III-F-5-b-vi. Where TPI's Special Non-Movable Bridges contain Type II and Type IV spans, they had to be corrected as previously discussed. *See supra* III-F-5-b-ii; III-F-5-b-iv. Those corrections included adjustments to Type II Bridge superstructure beam size, corrected unit prices for Type II Bridge bearing pads and bearing plates, corrected unit price for Type IV through plate girder steel and total costs for Type IV abutments. *See supra* III-F-5-b-ii; III-F-5-b-iv.

TPI's Special Non-Movable Bridge cost calculations also required correction for the same error as detailed for the Mixed Span Bridges: the superstructure span costs included only total variable costs per foot of the spans, but did not include the fixed cost per span. CSXT's Bridge Engineering Experts corrected these calculations to include both aspects of the bridge superstructure cost.

All of the corrections that CSXT's Bridge Engineering Experts made are highlighted and annotated for reference in CSXT Reply Workpaper "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Special Non-Movable Bridges."

viii. Truss Spans

With the exception of three bridges, all Special Non-Moveable Bridges on the TPIRR contain at least one truss span. The use of truss spans introduces many new factors and challenges that are not present on the standard Types I through IV bridges or the Tall Bridges. These new and different issues cannot be addressed using standard Types I through IV bridge components.

TPI calculated the weight of two example trusses in order to determine an average weight per foot for the two example trusses in aggregate. TPI then applied this unit weight per foot value to the required truss lengths for the bridges in the "Special Non-Movable Bridges" category in order to estimate the weight of steel required for each truss span.[277] CSXT does not object to this general estimating approach. However, as with the steel towers on the Tall Bridges, TPI also made several mistakes in computing the weight of steel on the two example trusses.[278] CSXT's Bridge Engineering Experts corrected these errors and used the corrected weight per foot to calculate the weight of steel in the truss spans for the bridges in the "Special Non-Movable Bridges" category.[279]

TPI proposed to support the heavy truss spans in this category with its standard Type III piers and its standard Type III abutment. This would not work. Consider Bridge 000 775.4 on the Atlanta Division. This bridge contains 8 truss spans where each non-movable truss span is approximately 336 feet long.[280] TPI's Type III pier is designed for a span length of just 92.5 feet in length. It is patently unreasonable to assume that the Type III pier could be used to support a span more than 3.5 times longer than what it was originally designed for. The superstructure dead loads alone for the truss span are more than 300% larger than those of the 92.5 foot span and the live loads are larger by a similar multiple. TPI's Type III pier would instantly crumble under the weight of the steel truss spans. Further, the top of the Type III pier is not even physically large enough to accommodate the width of the truss spans.

The flaws in TPI's substructure elements for these truss spans are not limited to these piers located in the middle of the bridges. Generally, the layout for these bridges would be such that the truss span or spans would be toward the center of the bridge's length, to provide the

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[277] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Special Non-Movable Bridges," cell H3.

[278] *See* CSXT Reply WP "462-Foot Truss Weight Check Correction.pdf."

[279] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Special Non-Movable Bridges," cell H6 and Column BF.

[280] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Special Non-Movable Bridges," cells AA18 and AB18.

greatest horizontal clearance across the waterway. This is standard procedure to provide the largest possible navigation clearance. In the case of non-navigable waterways, it makes sense to avoid placing piers in the waterway if possible simply due to the increased cost of building piers in the water versus on dry land. In addition, the layout for several of these bridges necessitates a truss span being at one or both ends of the bridge. Consider Nashville Division Bridge 000 185 for example: TPI's proposed layout contains three total spans, two of which are non-movable truss spans and one of which is a movable span.[281] Logic dictates that the movable span must be at the center of this bridge's length, which means that these non-movable trusses must be founded upon an abutment. In instances where a truss span must necessarily be founded upon an abutment based on TPI's proposed bridge layout, TPI used one of its standard Type III abutments to support the truss. Like the Type III piers, the abutments designed for the standard Type III superstructure span of no more than 92.5 feet in length, are not adequate to support the loads imposed on them by long-span trusses with lengths from 200-feet to over 500-feet long.[282] Also like the Type III pier, the Type III Abutment is not physically large enough to accommodate the truss span. It simply would not fit.

To correct these deficiencies, CSXT's Bridge Engineering Experts developed a pier design and an abutment design that are both physically large enough for the trusses to fit on them, as well as capable of supporting the loads that would be imposed on them by one of these long-span trusses.[283] Based on the quantities associated with CSXT's truss substructure design, CSXT's Bridge Engineering Experts estimated the construction cost of these substructure units

[281] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Special Non-Movable Bridges," cells AA7 and AI7.

[282] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Special Non-Movable Bridges," Column AC.

[283] *See* CSXT Reply WP "Truss Span Substructure Design.pdf."

using TPI's unit prices for steel piles, steel pile tips and concrete. All corrections are highlighted and annotated in CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Special Non-Movable Bridges."

ix. Oversized Culverts

Similar to Special Non-Movable Bridges, TPI's bridge narrative does not include any discussion of oversized culverts, but its bridge cost spreadsheet includes a separate inventory with associated costs. The structures listed in TPI's bridge cost spreadsheet as "oversized culverts" are culvert structures that TPI assumes can be replaced with Type I Bridges. The existing CSXT structures include arches, large box culverts, large diameter pipe culverts, and similar structures. CSXT does not dispute TPI's premise that certain oversized culverts could be replaced with Type I Bridges. However, TPI's assertion ignores many of the specific characteristics of each culvert that resulted in the real world selection of a culvert instead of a bridge.

The main deficiency in TPI's evidence for these structures is that the bridges it proposes to use to replace oversized culverts are generally much shorter in length and height than the size of the bridge that would actually be required in place of a culvert. The bridge length and height required to replace a culvert are functions of the existing culvert width and the depth from the base of the culvert to the track elevation. TPI failed to properly account for both of these elements in developing costs for replacing existing structures with Type I Bridges.

First, the bridge length that TPI assigned to each of the replacement bridges is limited to the width of the actual culvert it would replace. That would be workable only if TPI had designed and estimated costs for deep abutments for those bridges, because when a deep abutment is used, the horizontal clearance provided by the bridge is approximately the same as the span length. However, TPI proposed to replace these oversized culverts with bridges that use its standard Type I abutments. The problem with that is these standard abutments require the use of a spill slope in front of the abutment. By selecting the standard abutment, but not adding the requisite length of bridge to account for the spill slopes on the standard abutment, TPI mixed apples with oranges; it's incongruent and the resulting cost is meaningless.[284] The sketches in this workpaper illustrate that TPI could substitute bridges for the oversized culverts in one of two ways:

1. Build a bridge with same span length as the culvert provides, but build the bridge with more expensive deep abutments; or
2. Build a bridge using cheaper standard abutments, but add to the bridge's overall length to account for the required spill slope for the standard abutment.

Either approach is reasonable, but the two approaches are mutually exclusive—the TPIRR would be required to follow one approach or the other. It must apply consistently all elements of one approach or all elements of the other approach. Because TPI's proposal selectively attempted to use an element of one approach selectively with an incompatible element of the other approach (no spill slope), its proposal is infeasible and must be rejected. CSXT's Bridge Engineering Experts have corrected this error by adding the necessary spill slopes and increased bridge lengths required to accommodate TPI's standard abutments.[285]

<u>Second</u>, the bridge height that TPI assigned to each replacement bridge is the height of the culvert it would replace and does not account for any fill between the top of the culvert and the track. TPI's assumption would be valid only in those few instances in which the track is located directly on top of the culvert, typically where box culverts are today. Where that is not the case, the culvert is buried below the track with fill between the top of the culvert and the

[284] *See* CSXT Reply WP "Oversized Culvert Replacement Options.pdf."

[285] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Oversized Culverts" in Column BY.

track.[286] Where there is a value for "Culvert Depth," the bridge height is equal to the existing culvert height, plus this "Culvert Depth" value.[287] TPI's replacement bridge height assumption fails to account for this additional necessary bridge height.

CSXT's objections to both the proposed bridge length and bridge height are illustrated with an example of an actual oversized culvert that TPI proposes to replace with a Type I bridge in CSXT Reply Workpaper "Oversized Culvert Replacement Comparison.pdf." The first page of the workpaper shows how an abutment requires a certain amount of earth around it, which includes the spill slope in front of the abutment. If there were no spill slope in front of the abutment, its piles would be exposed. In addition to the decrease in load capacity that this would cause, due to the fact that the piles would have a significant unbraced length, it would also create risk of bridge failure due to scour. There is no question that TPI's standard abutments require spill slopes.

The second page of CSXT's Reply Workpaper "Oversized Culvert Replacement Comparison.pdf" gives a visual illustration of why TPI's proposed replacement bridges are inadequate to replicate many of the oversized culverts. This workpaper shows a sketch of existing Box Culvert BA 128.8 on the Baltimore Division. The top left corner shows what the existing 24-foot x 24-foot culvert would look in cross section under the track. TPI proposed to replace this 24-foot x 24-foot box culvert with a Type I Bridge of just 24 feet in length.[288] The sketch on the top right corner shows what this drainage structure would look like if the 24-feet x

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[286] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Oversized Culverts," Column S "Culvert Depth," which indicates the amount of fill between the track and the top of the existing culvert.

[287] *See id.*

[288] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Oversized Culverts," Line 48, Columns I & J and Column AX.

24-feet box culvert were replaced with a bridge that was only 24 feet long. Note that the required spill slopes in front of the abutments completely fill up the cross sectional area that is open for drainage on the existing box culvert. This workpaper makes it very clear that TPI's proposed layouts for the bridges to replace these oversized culverts are unworkable. Simply, the proposed bridge does not provide the drainage area present on the existing box culvert.

In order to replace oversized culverts with Type I Bridges, TPI must of course ensure that it preserves the functionality of the existing drainage structure. But TPI performed no watershed and drainage calculations to prove that any of these existing culverts could be blocked off to any degree by embankment while preserving the functionality and necessary capacity of the existing structures. To correct this omission, the CSXT's Bridge Engineering Experts developed bridge layouts sufficient to preserve the functionality of the culverts that they would replace.[289]

The bottom of Page 2 of CSXT Reply Workpaper "Oversized Culvert Replacement Comparison.pdf" is a sketch that shows how CSXT's Bridge Engineering Experts properly calculated replacement bridge lengths. First, CSXT's Bridge Engineering Experts determined the width of the existing culvert. Then, CSXT's Bridge Engineering Experts determined points to start the abutment spill slopes on either side of the width of the culvert opening, such that the slopes would not reduce the width of the opening. From that point on either side of the existing culvert width, the spill slopes angle back toward the abutment at the CSXT standard 2 (horizontal) to 1 (vertical) slope until they have reached the proper vertical dimension. CSXT corrected TPI's proposed bridge lengths and bridge heights for bridges replacing culverts and

[289] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Oversized Culverts" in Columns BX-CC.

similar structures.[290] All other corrections to the costs for this classification of bridges are made on this same tab of the workpaper spreadsheet, highlighted and annotated for reference.

Additionally, as with other bridge type classifications, location factors have been added to the costs for Oversized Culverts, as discussed above.[291]

x. Movable Bridges

TPI proposed to replicate the movable bridge spans on the TPIRR route with one of two different movable span types; either bascule spans or vertical lift spans. The unit price that TPI posited for bascule spans is completely unsupported.[292] For this reason alone, the Board should reject TPI's proposed unit costs for bascule spans as lacking evidentiary support. In addition, as demonstrated below, TPI's proffered unit price is unreasonable and inconsistent with real world costs. CSXT rejects the unit price for bascule spans posited by TPI.[293]

CSXT rejects the method TPI used to apply the unit prices to estimate vertical lift span costs. CSXT also rejects the manner in which TPI determined which type of movable bridge would be used in the TPIRR structures, (bascule or vertical lift). CSXT further rejects TPI's proposed 10% cost share for movable bridges, as unsupported and contrary to law and Board

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[290] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Oversized Culverts," Columns BX and BY.

[291] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Oversized Culverts," Column CQ and cells CT4-CV22.

[292] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "TPI Special Movable Bridges," cells C40-E47.

[293] The source of TPI's proposed unit cost is not mentioned in TPI's narrative evidence, or in its workpapers. However, this unit price is the same as a complainant proffered in a prior SAC case, which was based on the construction of CSXT Bridge 706.7 in Pascagoula, MS in 1994 where the subject bridge included a 170-foot bascule span as part of its 775-foot total length. TPI replicates the same bridge on the TPIRR. *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "TPI Special Movable Bridges," Line 15. This is important because it allows a back-check test of the reasonableness of TPI's proposed unit cost for bascule spans, which CSXT describes below.

precedent. Finally, CSXT rejects TPI's use of the "bridge clearance" level as the actual pier height in determining substructure costs for the approach spans leading up to movable bridges. Using the "bridge clearance" for the pier height does not account for the portion of the pier that is below the waterline. Each of these movable bridge cost issues is discussed in more detail below.

(a) Bascule Span Bridges

With respect to bascule spans, TPI relies on a wet-finger-in-the-air approach that it recycled from a prior case as the basis for its proposed unit costs for the bascule spans on the TPIRR. In the prior case, complainant Seminole Electric Cooperative, Inc. ("SECI") included in its rebuttal evidence the unsupported assertion that "[m]aking a generous assumption that 75 percent of the total cost of the bridge was attributable to the bascule span, the indexed cost per linear foot would be $65,492." And "Thus, on Rebuttal, SECI uses $65,492 cost per linear foot." *See* Rebuttal Evidence of Complainant SECI, *Seminole Elec. Coop., Inc. v. CSXT Transportation*, STB Docket No. 42110, at III-F-107 (Apr. 15, 2010). A baseless and untested "assumption" by a complainant in a prior case does not approach satisfaction of TPI's burden of proof regarding this unit cost. TPI's reliance on another party's unsupported speculation in a prior case should be rejected without further consideration. Moreover, as CSXT demonstrates below, objective evaluation of TPI's "generous assumption" shows it to be inaccurate and unreasonable.

If TPI's 75% assumption were reasonably accurate, it should be possible to use costs for the non-movable portion of the same bridge computed in this case and work backward to derive a bascule span cost that approximates the 75% cost assumption. In other words, starting with TPI's Opening evidence with regard to Bridge 706.7, as corrected by CSXT on Reply, and adjusting the cost back to 1994 dollars, the proportion of the movable span cost and non-movable span cost for this bridge should roughly reflect the 75%-25% movable-nonmovable span cost split assumption that TPI imported into this case.

Simple comparison of the costs demonstrates that the 75%-25% assumption is invalid. The corrected cost for the non-movable portion of this bridge is $1,349,541 in 3Q10 dollars.[294] Adjusting this cost back to 1994 dollars, when the bridge was actually built, yields an equivalent cost of $757,508 in 1994 dollars [1994 Cost Index = 103. 3Q10 Cost Index = 183.5. 1994 Cost = $1,349,541 x (103/183.5) = $757,508]. This value represents a mere 9.1% of the total 1994 cost of $8,336,800, which is obviously much smaller than 25% of the total cost assumed by TPI.

CSXT's Bridge Engineering Experts used the non-movable span costs as a constant to test TPI's bascule span "assumption" because those costs are based on actual data and analysis. The bascule span unit cost posited by TPI, in contrast, is nothing more than a guess that cannot be characterized as probative "evidence" and cannot be relied upon as a reasonable estimate of that cost. However, a real bascule span unit cost can absolutely be calculated, based on the fact that the non-movable span costs can be calculated and the total cost of the bridge built in 1994 is known.

On Reply, CSXT's Bridge Engineering Experts used the data TPI posited for Bridge 706.7 in its opening evidence, adjusted for the corrections discussed in previous sections of this narrative, to develop a reasonable price for the non-movable portion of Bridge 706.7. With that value known, the cost of the bascule span can then be easily calculated both in 3Q10 dollars and 1994 dollars. The analysis demonstrated that the calculated ratio of movable span costs to non-

[294] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Special Movable Bridges," cell BA15.

movable span costs is actually 90.9% : 9.1%, rather than 75% : 25%, as assumed by TPI.[295] CSXT's Bridge Engineering Experts applied the unit cost they developed to calculate costs for all TPIRR bascule spans.

Finally, location factors have been added to the costs for the non-movable approach span portions of the movable bridges, as discussed above.[296]

(b) Vertical Lift Span Costs

To estimate the cost of vertical lift spans, TPI proposed to apply a single per-foot unit cost to the length of the lift span. This approach is simplistic and incomplete and as a result substantially understated the construction cost of these complex bridges. TPI started with costs from a Value Engineering study for a CSXT-owned movable bridge conducted in 2006. CSXT does not object to the use of that cost data as a starting point. However, TPI then simply divided the total cost of that movable span example by its length, to develop a single gross cost per foot of the vertical lift spans on the TPIRR. CSXT rejects this oversimplification because it fails to account for the significant fixed costs associated with building these bridges. For example, every one of the movable bridges, whether it is 150 feet long or 450 feet long, includes a Machinery/Tender's House. This cost is a fixed cost that does not change with span length. In contrast, the total cost of the structural steel required for a truss span depends upon the length of the span, so that is a variable cost, which changes with the length of the span.

TPI's failure to compute separate fixed costs and variable costs contradicts the approach TPI itself consistently used to calculate the costs of all of its standard bridge types and components. All of TPI's standard Types I through IV bridges calculated both fixed and variable

[295] *See* CSXT Reply WP "Bascule Span Corrected Unit Cost.pdf" for a detailed calculations and a description of all values used in the analysis.

[296] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Special Movable Bridges," Column BD and Cells BG2-BI20.

costs.[297] For example, the superstructure components of the standard Types I through IV bridges contain fixed costs which include bearing pads and bearing plates. Every span requires these components, regardless of its length. The variable costs of those superstructure components include superstructure beams, handrails and deck drains, whose costs are dependent on the actual length of the span being replicated.[298]

Similarly, TPI's proposed costs for Types I through IV substructure units are made up of both a fixed cost and variable cost. The fixed cost includes costs of the concrete cap, concrete footing, steel piles and pile tips, because every pier contains those components regardless of how tall it is. The variable cost consists of the "cost-per-foot" of the concrete pier stem, multiplied by the variable of the pier's height.[299]

TPI's proposed costs for tall steel towers also are made up of both a fixed cost and a variable cost. The fixed cost comes from the concrete pedestals, which every tower needs, regardless of how tall it is.[300] The variable cost comes from the "Cost per Foot" of the steel multiplied by each steel tower's height.[301]

As the foregoing examples illustrate, TPI recognized the need to separate fixed costs from variable costs to fairly and accurately calculate the construction costs associated with most

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[297] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Combined Bridge Component Costs" (delineating separate fixed costs and variable costs for Types I through IV bridges).

[298] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Combined Bridge Component Costs," cells G3-O26.

[299] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Combined Bridge Component Costs," cells B34-T76.

[300] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Combined Bridge Component Costs," cell D30.

[301] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "Combined Bridge Component Costs," Cells D29.

of the other bridges on the TPIRR. It simply failed to consistently apply the same cost development approach for vertical lift spans.

To correct TPI's error, CSXT's Bridge Engineering Experts evaluated the line item costs listed for the example bridge in the Value Engineering study relied upon by TPI, and classified each line item as either a fixed cost or a variable cost.[302] Using those classifications, CSXT's Bridge Engineering Experts calculated both fixed costs and variable costs for each vertical lift span on the TPIRR.[303]

CSXT also rejects TPI's criteria for designation of a bridge as a vertical lift span or a bascule span. TPI made the simplistic and unsupported assumption that "All swing spans will be replaced with a Bascule span."[304] This unsupported general assumption displays ignorance of bridge engineering and economics and raises serious doubts about whether TPI's engineers are qualified to analyze movable bridges.

TPI's proposed replacement of all CSXT swing spans with Bascule spans disregards standard bridge engineering practices. The bascule style of movable span is reasonable and economic up to a certain span length, and beyond that length the vertical lift span is more economical. In practice in the real world, the span length where bascules become less favorable as compared to vertical lift spans is in the range of 200-225 feet. That is not to say that there are no longer bascule spans in existence, but in such exceptional situations span type was likely determined by factors other than cost effectiveness, such as site constraints or available

[302] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Vertical Lift Unit Price Eval," Column H.

[303] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "Vertical Lift Unit Price Eval," cells G61 and G62 and Tab "TPI Special Movable Bridges," cells F59 and F60.

[304] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "TPI Special Movable Bridges," cell G40.

construction methods.[305] Regardless of the specific cut-off for economy of bascule spans, without question, there comes a point where bascule spans are not economically feasible and vertical lift spans are used instead. Consider an example: existing Bridge 775.4 on the Atlanta Division contains a 410-foot long swing span in the real world. However, TPI is proposing to replicate this existing movable bridge with a 410-foot long bascule span on the TPIRR.[306] A new movable span that required a length of 410 feet would have to be a vertical lift span. It would be cost prohibitive to build a 410-foot long bascule span, due to the amount of cantilevered span that would have to be lifted, which is further evidenced by the fact that there is no 410-foot long railroad bascule span in existence.

The longest existing bascule span on the network replicated by the TPIRR is 248-feet in length. CSXT's Bridge Engineering Experts used that as a reasonable line of demarcation between bascule spans and vertical lift spans. Any movable span with a required span length equal to or less than 248 feet should be replicated as a bascule span. Any movable span with a required span length longer than 248 feet should be replicated as a vertical lift span. CSXT's Bridge Engineering Experts used this length division to separate bascule spans and vertical lift spans on TPIRR bridges.[307]

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[305] On the real world CSXT routes replicated by the TPIRR there are two long bascule spans at 245-feet and 248-feet, respectively. All other bascule spans on the lines replicated by the TPIRR have lengths of 197-feet or less.

[306] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "TPI Special Movable Bridges" in cell W34.

[307] *See* CSXT Reply WP "TPI Bridge Construction Costs CSXT Reply.xlsx," Tab "TPI Special Movable Bridges," Column AT (designation for each bridge).

(c) TPIRR Would Bear Full Costs of Movable Bridges Unless it Provides Clear Evidence That Another Party Bore a Portion of Those Costs.

Finally and importantly, CSXT rejects TPI's assumption that the TPIRR would bear only 10% of the costs of movable bridges on the TPIRR route. TPI claims that "CSXT is entitled to Truman-Hobbs Act funding for movable bridges so the TPIRR must also be entitled to access these funds. To deny the TPIRR the ability to take advantage of this funding is a barrier to entry."[308] As explained below, this claim misapprehends the intent and operation of the Truman-Hobbs Act and its limited discretionary funding. The argument is also foreclosed by clear, binding Board precedent. *See SunBelt*, STB Docket No. 42130, at 142; *DuPont*, STB Docket No. 42125, at 223.

First, neither CSXT, nor any other private party constructing a moveable bridge, is entitled to any federal funding authorized by the Truman-Hobbs Act. Nor would the TPIRR have any such entitlement. Bridge owners may not even make application for Truman-Hobbs Act funding. The entire process is initiated by the U.S. Coast Guard at its sole discretion.[309] This document, promulgated by the U.S. Department of Homeland Security, specifically provides that "Under the T-H Act, USCG issues an Order to Alter to owners of bridges that are unreasonable obstructions to navigation," and ". . .USCG pays the U.S. government's share of the costs necessary for the bridge owner to comply with the order."[310] This language makes it clear that the Truman-Hobbs funding process is initiated by the USCG making an Order to Alter, rather than by a bridge owner making an application.

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[308] *See* TPI Opening III-F-46.

[309] *See* CSXT Reply WP "DHS OIG-12-09.pdf."

[310] *See* CSXT Reply WP "DHS OIG-12-09.pdf," at 1.

Second, even assuming that a bridge owner could apply for funding through the Truman-Hobbs Act—which it may not—such funds would not be available for the construction of a SARR. A SAC analysis assumes the construction of a stand-alone railroad from scratch in an area where there is no existing railroad infrastructure in place. But Truman-Hobbs Act funding is authorized only for use in the replacement of existing structures: "The act provides for federal funding to alter lawfully constructed railroad or publicly owned bridges that allowed for the reasonable needs of navigation at the time of construction, but not longer do so because the character of navigation has changed. Under the T-H Act, USCG issues an Order to Alter to owners of bridges that are unreasonable obstructions to navigation."[311] This definition clearly eliminates the Truman-Hobbs Act as a possible funding source for new bridges constructed on the TPIRR. The movable bridges constructed by the TPIRR are assumed to be original bridges where there is no existing railroad infrastructure in place. Those bridges would not modify or replace previously constructed bridges that at one time satisfied the needs of navigation, but no longer do. Consistent with the limited purpose and application of the Truman-Hobbs Act, there is no evidence that any moveable bridge replicated by the TPIRR received any Truman-Hobbs Act funding to subsidize the cost of its construction when the bridge was originally built in virgin territory.

Unless a party provides evidence demonstrating otherwise, a SAC analysis must assume that the incumbent railroad bore the full cost of constructing the movable bridge when the structure was originally built, and thus the SARR must bear that full cost. *See, e.g., DuPont*, STB Docket No. 42125, at 223. Because TPI presented no evidence showing that the government or another party paid part of the cost of building movable bridges on the TPIRR

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[311] *See id.*

system, the TPIRR—like CSXT and its predecessors—must bear 100% of the cost of the original construction of the movable bridges. This full construction cost is not a barrier to entry for the SARR, it is exactly what the original bridge owner had to pay to construct the movable span. If TPI wished the Board to consider a different result, *e.g.* that the TPIRR would pay less than the full replacement cost of alternatives, it would be required to produce evidence showing the railroad did not pay 100% of the cost for its movable bridges. TPI produced no such evidence, and therefore its assertion that the TPIRR should pay less than 100% of the cost to build its original movable bridges is unsupported and must be rejected. TPI presents no arguments or evidence to differentiate its argument for Truman-Hobbs Act funding from those presented and rejected by the Board in *DuPont* and in *SunBelt.*[312] As the Board summarized in rejecting complainant's identical argument in *SunBelt:*

> The Truman-Hobbs Act applies to the retrofitting or replacement of existing bridges over waterways to accommodate water traffic whose changed characteristics require a change in the bridge . . . [The] SAC analysis involves constructing new infrastructure for the hypothetical SARR – not removing and replacing the incumbent railroad's existing infrastructure.

SunBelt, STB Docket No. 42130, at 142 (emphasis added). Consistent with the clear terms and purpose of the Act and its implementing regulations, and consistent with Board precedents rejecting the identical arguments, TPI's misguided claim that the TPIRR would pay only 10% of

[312] In *SunBelt* and *DuPont,* the Board also rejected the complainant's companion claim that the American Recovery and Reinvestment Act's ("ARRA") appropriation of funds for Truman-Hobbs Act projects provided funds for the original construction of moveable bridge spans. *See, e.g., SunBelt*, STB Docket No. 42130, at 142; *DuPont*, STB Docket No. 42125, at 223. The relevant provision of the ARRA merely appropriated some limited funds to be used for the program authorized by the Truman-Hobbs Act. The provision of limited funding for the program did not change the narrow authorized purpose of the use of those funds, and did not allow them to be used for original construction of bridges.

the costs of its moveable bridge costs must be rejected. Correction of this understatement of costs increases TPIRR bridge costs by approximately $1.08 Billion.

(d) TPI's Pier Heights Would Be Too Short to Support the TPIRR Bridges.

Finally, CSXT rejects TPI's use of the "bridge clearance" value as the measure of pier height in calculating substructure costs for the movable bridges. The "bridge clearance" measure alone does not account for the portion of a pier that is below the waterline. Railroad bridge piers do not float on top of the water; they are anchored to the ground below the water. Consider an illustrative example. Jacksonville Division Bridge 703.7 is shown to have a "clearance" of just 10 feet.[313] First, note that CSXT's documented reference for channel depths identifies this bridge location as having just 7 feet.[314] In cell AL20 of TPI's opening workpaper, where TPI calculates "Type III Substructure Costs," TPI's formula refers back to this 10-foot value in Cell U20 to determine which height of Type III pier to include in the cost. However, in this bridge location, the documented water depth is 23 feet.[315] That 23 feet of water depth needs to be added to the 7-foot clearance value to arrive at the actual required pier height, which would be 30 feet, instead of the 10-foot value proposed by TPI.[316] This example is offered to demonstrate that TPI did not take into account the depth of the water where these bridges are located when it assigned pier heights. TPI essentially set the pier height to equal the vertical clearance value, which would imply that TPI is proposing to build these movable bridges with floating piers (*i.e.* piers not founded in the solid bottom of the waterway). This, of course, would not be feasible.

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[313] *See* TPI Op. WP "TPI Bridge Construction Costs.xlsx," Tab "TPI Special Movable Bridges," cell U20.

[314] *See* CSXT Reply WP "Movable Bridge Channel Depth Exhibit.pdf."

[315] *See* CSXT Reply WP "Movable Bridge Channel Depth Exhibit.pdf."

[316] *See* CSXT Reply WP "Movable Bridge Channel Depth Exhibit.pdf."

CSXT's Bridge Engineering Experts found the same error on 20 out of 21 locations where both the vertical clearance and the actual water depth could be verified by a reliable independent source.[317] The average value of the TPI understatement of pier heights is 12 feet.

Some account has to be made for the addition of the water depth onto the pier heights proposed by TPI, and therefore, CSXT has added a blanket five feet to the pier heights on all movable bridges. This value, applied across the movable span inventory, provides a conservative adjustment to ensure that the movable bridges on the TPIRR are not "floating" on top of the water.

All of TPI's evidence regarding the construction costs for other categories of bridges has this same shortfall. However, the movable bridge category is the only one where the actual water depth is easy to ascertain for a representative sample size with precision. TPI's failure to account for necessary pier height below the waterline results in a systematic understatement of pier costs for TPIRR bridges over water; however, CSXT has not attempted to correct this error in TPI's bridge costs among the other categories of bridges, because of the lack of precise water depth data. Accordingly, CSXT's bridge pier cost evidence for all bridges over water, except those with moveable spans, is conservative and likely substantially understates the actual replacement costs, because navigation maps publish the water depths around movable bridges.

xi. Highway Overpasses

CSXT accepts TPI's proposed cost per square foot of deck area for calculating construction costs of the highway overpass structures. CSXT also accepts TPI's proposed 10% cost share for replicating the highway overpass structures. However, as with many other areas of

[317] *See* CSXT Reply WP "Movable Bridges Channel Depths.pdf."

its bridge evidence, TPI failed to apply its unit cost in a manner that fairly and accurately represents the construction costs for the highway overpass bridges on the TPIRR.

TPI proposed to estimate the deck area of highway overpass bridges based solely on very broad statistical data from the respective county in which a bridge is located. TPI used generalized data published by FHWA which estimates the average deck area of all the bridges on a county-wide basis. CSXT rejects TPI's imprecise and overly broad approach to estimating specific highway overpass bridge deck area on the TPIRR for two reasons.

First, a county-wide average of deck areas for the structures on the TPIRR is far too broad and blunt a measure to accurately determine the specific individual deck areas of bridges. For example, the TPIRR would not replicate small two-lane county road bridges over a dry wash, but the deck area of that type of bridge is included in the overall county-wide average that TPI uses. Including that type of small, irrelevant bridge pushes the average deck area down such that it does not accurately represent a typical highway overpass on the TPIRR. The types of bridges that TPI must replicate for this category of bridges on the TPIRR are all relatively large structures, as they must be long enough and tall enough to clearly span a railroad. For example, none of the highway overpass bridges on the TPIRR will have a vertical clearance of less than 23 feet, because they must all provide proper vertical clearance for a train to pass underneath. But, many hundreds of country bridges that are included in the Federal Highway Administration's ("FHWA") statistical data have vertical clearances less than 23 feet. The length of the bridge spans for the highway overpass bridges similarly must have a minimum horizontal clearance, in order to completely span the railroad's right-of-way that passes under the bridge. However, many hundreds of county bridges that are included in FHWA's statistical data have horizontal clearances less than what is required to completely span the railroad's right-of-way.

If TPI wished to use an average bridge deck area, at a minimum the group of structures from which the average was derived was required to be similar in size to the bridges it proposes to replicate.

Second, the average deck area of all the bridges in each county is artificially low for another reason. For bridges for which the FHWA lacks deck area information, its county-wide average assumes the deck area is zero, thereby significantly distorting the average.[318] This county-wide average published by FHWA includes the bridges for which it has no published deck area as zero. To calculate an accurate gross average, bridges with no published deck area should be excluded so as not to artificially understate the average bridge deck area.

These two distorting factors combined to generate a TPI average deck area that does not remotely represent the area of the bridges on the TPIRR. Fortunately, the FHWA data can be sorted by structure type, feature crossed, and other parameters. On Reply, CSXT has refined the data from FHWA using the following filters: 1) Bridges with deck area equal to zero were removed from the bridge deck area sample; and 2) the bridge sample from FHWA was limited to bridges that carry roads over railroads.[319] With these two adjustments, CSXT has refined the average bridge deck areas, based on a more accurate and representative sample of FHWA data, and then applied them to the highway overpass bridges on the TPIRR on a county-by-county basis.

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[318] *See* CSXT Reply WP "CSX Reply Highway Overpass Construction Cuyahoga County OH Example.xlsx."

[319] *See* CSXT Reply WP "TPIR Highway Overpass Construction CSXT Reply.xslx," Tab "Summary" in cells I2-K8.

Finally, the highway overpass bridges on the TPIRR require a location factor adjustment in order for the bridge construction costs to be fairly reflected. TPI cited five bridge construction projects as the basis for its highway overpass unit cost, all of which were constructed in the State of Florida. However, the TPIRR traverses 17 states and the District of Columbia. That is far too broad a geographical region to reasonably apply construction costs originating from just a single state. The Board acknowledged the legitimacy of apply location factors to highway overpass bridge unit costs when it adopted location-factor adjusted evidence in a recent case, finding "[t]he Board will accept NS's inclusion of Means cost location factors in the calculation of highway overpass costs because a review of DuPont's evidence reveals that it developed costs based solely upon projects from the Florida Department of Transportation. Given the wide geographical area the [SARR] traverses, the application of average location costs is the best evidence of record." *See DuPont*, STB Docket No. 42125, at 212.

Together, the foregoing corrections increased TPI's understated Opening total bridge deck area from 12,805,427 Square Feet to CSXT's more accurate Reply total bridge deck area of 21,945,005 Square Feet.[320] Accordingly, the total construction costs have been corrected from TPI's Opening Highway Overpass construction cost of $130 million to CSXT's more accurate Reply Highway Overpass construction cost of $228 million.

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[320] *Compare* TPI Op. WP "TPIRR Highway Overpass Construction.xlsx," Tab "Summary," cell D10 *with* CSXT Reply WP "TPIR Highway Overpass Construction CSXT Reply.xlsx," Tab "Summary," cell J8.

6. Signals and Communications[321]

TPI's case-in-chief assumed that the TPIRR would rely on "a standard CTC-based vital signal system with components added to provide Positive Train Control ("PTC")," and that it would rely on a microwave system for communications.[322] CSXT accepts the hypothetical assumption that a functioning, but not interoperable PTC system could be installed in 2010 and that the TPIRR would rely on a microwave system for communications. On Reply, CSXT has added costs that would be incurred by the TPIRR after the initial 2010 installation, consistent with those expenditures currently being made by other Class I railroads, to meet FRA-mandated interoperability standards. This Reply also corrects other significant shortcomings, omissions and flaws in TPI's costs for each of the Centralized Traffic Control ("CTC"), PTC, and microwave communications systems.

TPI's assumption of a fully functioning PTC at the outset of operations is both controversial and complex. For TPI's part, it simply asserted—without proving or providing meaningful support—that such a system could have been installed in the period leading up to TPIRR's commencement of operations in mid-2010. Significantly, TPI did not state how the TPIRR would accomplish this feat, nor describe the approach that the TPIRR, as a first mover in widespread implementation of nascent PTC technology, would take to address the myriad complexities that the real world railroads are struggling with today—more than four years later—to meet the current PTC mandate. Nor did TPI even identify the type of PTC system the TPIRR would install. TPI cited a number of examples of PTC system development prior to 2010

[321] CSXT's evidence regarding the costs to the TPIRR for signals and communications is sponsored by CSXT witnesses Gary Bonneau and Eugene Farrell (collectively referred to herein as "CSXT's Signals Engineering Experts"). Mr. Bonneau and Mr. Farrell both have extensive real-world experience in transportation communications systems. Their qualifications are further detailed in Section IV *infra.*

[322] *See* TPI Opening III-F-47.

to support its claim that it was feasible in 2010 to install a functioning PTC system. However, TPI asserted its costs for its PTC system are based on the ERTMS II system being installed by CSXT today, a system that is unrelated to any of the PTC-like systems referenced by TPI and for which many components TPI used as examples of 2010-vintage PTC-like systems, and which did not exist in 2010. TPI cannot have it both ways—either it may rely on technology and components that existed in 2009-10, or it may posit that the TPIRR would implement in 2014-15 the system CSXT is installing today. Further, despite ongoing and extensive expenditures by the industry for PTC component development and compliance with interoperability standards, TPI asserted that because some suppliers had some manner of PTC-like components—for systems that TPI is not installing—available prior to 2010, the TPIRR would not have incurred any development costs in order to implement a PTC-2015 compliant system.[323]

TPI has not met its burden of demonstrating the feasibility of installing in 2010 a fully functioning PTC system that would meet all interoperability standards of the Rail Safety Improvement Act and implementing regulations. Nor has TPI supported its assertions regarding to the cost of installing such a system. Accordingly, CSXT submits that TPI's unsupported assumptions should be summarily rejected. However, CSXT's Reply evidence accepts TPI's unsupported assertions that some form of PTC could have been implemented by a new entrant in 2010, because that position was endorsed by the Board's recent decisions in *DuPont* and *SunBelt*. In those cases, despite comprehensive and probative evidence that the complainants could not implement a fully functioning PTC system at the outset of SARR operations that would meet 2015 interoperability standards (which had not yet even been developed), the Board decided that the SARRs would first install PTC systems that were not interoperable, and later

[323] TPI Opening III-F-49.

upgrade those systems to meet 2015 Rail Safety Improvement Act ("RSIA") interoperability requirements.[324] The *DuPont* and *SunBelt* decisions offered no guidance on the types of PTC systems a SARR would install at the outset of operations. Instead, those decisions adopted the counterintuitive notion that the costs for a PTC system to be installed at the outset of SARR operations in 2009 or 2010 would be based on technology, equipment and price information from a defendant's PTC implementation plans, which included equipment that was not available when the SARRs commenced operations and is instead from a much later time period. The Board also failed to provide any insights regarding which of the myriad of development and other costs presented by defendant carrier in those proceedings should be considered as part of the SARR's initial installation of a PTC system.

CSXT believes that the Board's PTC rulings in *DuPont* and *SunBelt* are untenable and unworkable. However, CSXT is concerned that a showing of the impracticality of TPI's opening assumptions and evidence regarding a PTC system might not persuade the Board to overturn those recent precedents. Therefore, because *DuPont* and *SunBelt* ruled that a functioning, but not interoperable, PTC system could be installed at the outset of operations in 2009 and 2011, CSXT will abide by those rulings in Reply and accept TPI's hypothetical, counterfactual assertion that a PTC system could be installed on the TPIRR in 2010. Further consistent with those decisions, CSXT has assumed that the system would not meet interoperability standards and subsequently would have to be upgraded. *See DuPont*, STB Docket No. 42125, at 229-30; *SunBelt*, STB Docket No. 42130, at 145.

To develop and explain its Reply evidence, CSXT first identifies below the components the TPIRR theoretically might have installed in 2010. CSXT then estimates the investment,

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[324] *See DuPont*, STB Docket No. 42125, at 229-30; *SunBelt*, STB Docket No. 42130, at 145.

including development, testing, acquisition of requisite spectrum, and other costs the TPIRR would incur in installing such a system. Next, CSXT identifies the hardware, communications backbone and back office components from the original PTC system that would meet current FRA interoperability standards for 2015, and those that do not and would need to be replaced. CSXT has developed estimates for labor and materials for those components of the system that require replacement between 2011 and 2015. Finally, CSXT has estimated the additional testing, development and other costs that the TPIRR would incur, along with the rest of the railroad industry, in order to meet RSIA interoperability standards.

In addition to the issues related to PTC, there are a number of other shortcomings in TPI's development of CTC related signal components and their associated costs. Its calculations of signal unit costs flatly misstate the unit price quotes included in TPI's own workpapers and omit necessary signals components. TPI's development of investment for the TPIRR microwave communication system also requires a number of corrections. Below, CSXT's Signals Engineering Experts explain the errors in TPI's signals and communications evidence and detail their estimate of the TPIRR's signals and communications costs. Table III-F-18 compares TPI's Opening Evidence to CSXT's Signals Engineering Experts' estimate of the costs of TPIRR signals and communications.

Table III-F-18
Comparison of TPI and CSXT Signals Evidence

	TPI Open	CSXT Reply	Difference	Add. CSXT 2011-2015
Signals	$912,084,340	$1,154,811,965	$242,727,625	$-
…PTC Share - 1/	$74,373,076	$178,598,909	$104,225,834	$30,181,889
Communications	$282,794,523	$381,027,666	$98,233,143	$-
Hump Yard Equipment	$300,575,000	$300,575,000	$-	$-
Loco Radios	$58,695,420	$505,440,420	$435,129,630	$70,310,790
PTC Development	$-	$140,878,661	$140,878,661	$91,865,406
Total	$1,628,522,358	$2,661,332,621	$1,021,194,893	$192,358,084
1/ - Includes GIS and wayside equipment				

Source: CSXT Reply WP "TPI Signals & Communications CSXT Reply.xlsx"

a. Signal System Overview

i. The TPIRR Could Not Install PTC In 2010.

Although CSXT reluctantly accepts the notion TPI posits in its case-in-chief that "the TPIRR will install PTC at the beginning of TPIRR operations"[325] it does not believe TPI's position to be feasible or practical. CSXT accepts only the assumption that some type of PTC system could have been installed in 2010 and rejects TPI's further assertion that the PTC system the TPIRR would install in 2010 would meet RSIA 2015 interoperability standards.[326] CSXT submits that in reality, TPI's proposal is infeasible because critical PTC components still do not exist and certainly did not exist in 2010 when the TPIRR would begin operations. TPI's claim that it could reduce "investment expenditures" by "installing a PTC system from the outset" is both unfounded and disingenuous, because it would be impractical for the TPIRR to install a RSIA 2015-compliant PTC system years before any functional system existed. Any PTC-like

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[325] TPI Opening III-B-10; *id.* III-F-47.

[326] As explained above, CSXT accepts TPI's unsupported position because—but only to the extent that—the Board accepted a similar position advanced by complainants in *DuPont* and *SunBelt.*

system installed in 2010 would not meet RSIA-2015 interoperability standards and would need to be replaced—resulting in more, not less PTC investment.

Instead of reducing investment expenditures, TPI's proposal likely would result in more, duplicative investments for PTC—the first installments for a PTC system built with very limited components available before 2010 necessarily would be replaced with the equipment under development today. A more practical and realistic approach would be for the TPIRR to construct a CTC system for the beginning of operations in 2010 and then overlay a PTC system by December 31, 2015. This two-step process would be consistent with both the real world—in which CSXT and all other Class I railroads are required to convert their CTC systems to PTC—and with the Board's holding in *AEPCO 2011* that the SARR would be required to install PTC as an overlay to CTC in 2015.[327]

ii. TPI's Inventory of Signal Components is Flawed

TPI describes the TPIRR PTC system as a standard CTC-based vital signal system with components added to provide PTC. *See* TPI Opening III-F-48. Therefore, the appropriate starting point for the TPIRR PTC system is to identify the inventory of signal components required for a properly functioning CTC system. CSXT's Signals Engineering Experts accept TPI's method of assuming typical CTC component installations at various locations identified on the stick diagrams to develop TPIRR signal equipment inventories. However, TPI omitted or misapplied signal components for certain typical installations, and used incorrect unit costs for others. In this Reply, CSXT corrects the signal components for typical installations to include all required components and corrects unit costs where necessary.

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[327] *AEPCO 2011*, STB Docket No. 42113, at 33.

(a) Omitted or Misapplied Components

CSXT's Reply Evidence adds or modifies the following components to provide for complete and functional installations at typical locations.

Track Connections: TPI omitted track connections or track wires to connect to the rails at the near end (*i.e.*, the end closest to the signal house) and far end (*i.e.*, the end farthest from the signal house) for all track circuits. Track connections are necessary to make the physical connection between the rail and underground (track) cable as part of the track circuit and typically consist of 36" of ¼" bond strand with a sleeve on one end and a connector on the other end to plug into the rail. CSXT's Signals Engineering Experts included track connections for all track circuits (*i.e.*, signals, crossing signals and electric locks). CSXT's Signals Engineering Experts developed the cost of track connections from TPI's opening stick diagrams[328] and developed material costs for installation from Kimes Rail Inc.[329]

Cables: The cable used by TPI to connect AC Power between the service drop and the signal equipment shelter is inadequate. Alternating current (or "AC") electric service drops are wired for 240 volts, which requires a three conductor cable to connect the two phases and the ground tap. CSXT's Signals Engineering Experts therefore used higher capacity 3C#4 cable instead of TPI's proposed 2C#4. CSXT's Signals Engineering Experts developed the cost of cables from Wires and Cable To Go[330] and used the same labor cost that TPI used for cabling.

Grounding Kits: TPI did not include grounding kits for signal equipment shelters. Grounding kits are necessary to ground the signal shelter and protect railroad personnel from electrical shock and to protect electronic equipment from damage due to lightning strikes or

[328] *See* CSXT Reply WP "Track Connection Cost.pdf."

[329] *See* CSXT Reply WP "Track Connection Cost.pdf."

[330] *See* CSXT Reply WP "3C4AWG Cable Cost.pdf."

power surges. It is critical that signal equipment shelters have excellent grounding, because the electronic equipment required for the TPIRR's signals would be susceptible to damage by foreign current, causing failure of the signal or crossing signal system. CSXT's Signals Engineering Experts developed the cost of grounding kits[331] and developed labor costs for installation from Interrail.[332]

Fencing: TPI does not provide standard fencing around the TPIRR's intermediate or interlocking signal huts. These huts are high value pieces of equipment that are spread throughout the TPIRR system and subject to numerous security and vandalism threats. Consistent with real-world practice, CSXT develops costs to provide fencing for TPI's huts based on a quote from Industrial Fence to install fencing at an existing CSXT signal hut.[333]

(b) Incorrect Unit Costs

CSXT corrects certain of TPI's signal component unit costs to conform to the supporting documentation TPI provided, and provides supported alternatives for certain of TPI's unsupported proposed unit costs.

Foundations: TPI posited a cost for signal foundations of $250 per location but provided no explanation or documentation regarding how that figure was derived. CSXT's Signals Engineering Experts reject this cost as too low and instead use a documented cost of $610 for 60" precast foundation based on a quote from RR Signal International.[334]

Battery/Chargers: The cost TPI used for 24 volt batteries conflicted with the documented cost information it provided. CSXT's Signals Engineering Experts used a price of $4,100 based

[331] *See* CSXT Reply WP "Ground Rod Cost.pdf."

[332] *See* CSXT Reply WP "Ground Rod Cost.pdf."

[333] See CSXT Reply WP "Fencing Quote House.pdf."

[334] *See* CSXT Reply WP "Foundation Cost.pdf."

on TPI's evidence instead of the $3,000 that was based on a "GT Estimate" that included no documentation.[335]

Switch Machines: TPI also misstated unit costs for switches. Specifically, TPI's calculations used material unit costs for Power Mainline Switch Machine 24VDC of $15,126, and Manual Mainline Switch Machine of $16,890.[336] However, the supporting documents in TPI's workpapers show that it was quoted prices of $26,000 for the Power Mainline Switch Machine 24VDC and $21,000 for the Manual Mainline Switch Machine. CSXT has corrected these costs to reflect the price quotes in TPI's opening workpaper "S & C Workpapers.pdf" in its Reply.[337]

Insulated Joints: The cost TPI used for insulated joints was not clearly documented and conflicts with the actual costs incurred by CSXT that were produced in discovery. As TPI explained, insulated joints are necessary to establish breaks in track circuitry between signal blocks. TPI uses a cost for "glued" (a.k.a. "bonded") insulated joints based on an indefinite email exchange with a Progress Rail representative that did not even specify whether or how much rail would be included with the joint. Bonded insulated joints are pre-fabricated in the middle of lengths of rail (typically twenty-feet) and then delivered for installation. The installation consists of cutting out a length of continuously welded rail and then welding in the new length that includes the insulated joint.[338] CSXT rejects TPI's undocumented cost of $213

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[335] *See* TPI Op. WPs "TPI Signals & Communications.xlsx," Tab "Components and Tabulation," Line 24 and "S-C Workpapers.pdf" at 16.

[336] *See* TPI Opening WP "S & C Workpapers.pdf" at 19.

[337] *See* CSXT Reply WP "TPI Signals & Communications CSXT Reply.xlsx," Tab "Components & Tabulation," Lines 19 and 20."

[338] TPI narrative states that the rail contractor will provide labor for field welds and notes that material costs for field welds for insulated joints (among other locations) are added. However, TPI's workpapers do not account for material costs for field welds for insulated joints. Compare

per insulated joint and uses a more realistic cost of $1,528 per insulated joint, which is a documented price that CSXT paid for a bonded insulated joint installed on a twenty foot long piece of rail.[339]

(c) Outdated Unit Costs

In numerous instances, TPI's opening signals evidence relies on quotes from 2005 to develop costs for the TPIRR construction estimate as of 3Q2010. TPI's proffered costs for interlocking and intermediate huts, signals, switches, electric locks, batteries, cables, FEDs, crossing predictor huts, and VHF LMR radios, among other items, were all based on 2005 price levels that TPI did not adjust to reflect 2010 cost levels. To develop costs for the TPIRR construction period, CSXT's Signals Engineering Experts indexed TPI's 2005 costs to 3Q2010 price levels using the AAR's Rail Cost Recovery Index for Materials, Wages, and Supplies Excluding Fuel (East).[340] This method is consistent with how the Discounted Cash Flow Model adjusts signal and communication costs to account for the three-year SARR construction period.

b. PTC

As discussed above, TPI's assumption that the TPIRR would begin operations with a fully interoperable PTC system is not only plainly infeasible, it is impossible because neither interoperability technology nor final governing standards existed at the time the TPIRR was under construction. While the practical approach would be instead for the TPIRR to begin operations with a CTC system and to overlay PTC by December 31, 2015 as required by the

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TPI Opening III-F-32 and TPI Op. WP "Track Construction.xlsx," Tab "Summary." CSXT accounts for these costs in track construction. *See supra* III-F-3-d-iv.

[339] *See* CSXT Reply WP "Insulated Joint.xlsx."

[340] *See* CSXT Reply WP "TPI Signals & Communications CSXT Reply.xlsx," Tab "Index Factors."

RSIA, CSXT's Signals Engineering Experts, in accordance with the Board's rulings in *DuPont* and *SunBelt*, developed TPIRR PTC installation costs in the manner described below.

CSXT first identified the components of a PTC system the TPIRR hypothetically might have attempted to install in 2010. CSXT then estimated the investment costs for such a system, including development, testing, acquisition of requisite spectrum and other costs the TPIRR would incur in installing the system. CSXT next identified the hardware, communications backbone, and back office components from the initial TPIRR PTC system that meet RSIA 2015 standards (including interoperability) and those that would not and therefore would need to be replaced by the end of 2015. CSXT has developed estimates for the costs of labor and materials for the components of the system that would require replacement. Finally, CSXT estimated the additional testing, development and other costs that the TPIRR would incur along with the rest of the railroad industry in meeting interoperability standards.

i. TPIRR PTC System 2010

TPI stated that a variety of manufacturers and railroads were using and/or developing PTC technology prior to 2008, and identifies four examples:

1. Electronic Train Management System ("ETMS") Version 2;
2. Advanced Civil Speed Enforcement System ("ACSES") and ACSES II;
3. Incremental Train Control System ("ITCS"); and
4. Interoperable Communications-Based Train Control System ("ICBS").

TPI did not identify which, if any, of the identified PTC technologies it assumed the TPIRR would install.[341] Instead, TPI simply derived its PTC unit prices from discovery

[341] TPI asserted that its PTC costs are based on the ERTMS II system, but provides no explanation of what that system represents or what technology it uses. *See* TPI Opening III-F-48, n.147.

materials provided by CSXT in the fourth quarter of 2013, which includes costs for the V-ETMS PTC system CSXT is currently installing across its system, four years after the TPIRR assumes the TPIRR would commence operations using a PTC system. The CSXT V-ETMS PTC system is comprised of:

- The Office Segment
- The Wayside Segment
- The Communications Segment
- The Locomotive Segment

Although many of the components of CSXT's V-ETMS PTC system were not available in 2010, CSXT will assume for purposes of this Reply that somehow the TPIRR would install a V-ETMS PTC system in 2010. CSXT will further assume that all of the components installed as part of the Wayside Segment would not have to be replaced as part of the upgrade to interoperability. As discussed in more detail below, even with the assumption that the TPIRR could install certain components of a V-ETMS-based PTC in 2010, it would require substantial additional expenditures to upgrade components of the Office, Communications and Locomotive Segments to meet interoperability standards.

ii. TPIRR 2010 PTC System Investment

The investment required to develop, test, acquire and install the PTC system is summarized in Table III-F-19 below.

Table III-F-19
Summary of PTC Investment

Component	TPI Open		CSXT Reply	
	2010	2011-2015	2010	2011-2015
PTC Back Office System	-	-	10,000,000	2,500,000
PTC Wayside Interface Unit	40,099,224	-	88,772,839	-
PTC Radio and Antenna	19,552,000	-	51,397,970	30,181,889
PTC Locomotive Units	58,695,420	-	505,440,420	70,310,790
Technical Development & Support	-	-	44,157,812	11,039,453
Testing	-	-	71,615,318	17,903,830
GIS	14,721,930	-	38,428,100	-
Communications	-	-	15,105,531	60,422,123
Total	133,068,574	-	824,917,990	192,358,084

As Table III-F-18 shows, as a first mover on the PTC front the TPIRR would incur substantial installation, development, testing and communications costs in 2010. It also would incur additional costs to upgrade its 2010 system to meet subsequent interoperability standards. Details of CSXT's Reply PTC costs estimate are described below.

(a) PTC Office Segment

The TPIRR PTC back office system includes costs for servers required to run the PTC system, a disaster recovery system and for the costs associated with integrating the TPIRR train dispatch system with its PTC system. This PTC back office segment is different from the back office components needed to run the TPIRR CTC signals, sensors and switches. In its discovery materials provided to TPI, CSXT included an estimate for PTC back office system related expenditures of $10 million. TPI did not include any of these costs as part of its proposed PTC system. On Reply, CSXT has included CSXT's $10 million estimate as part of the initial startup PTC system. CSXT also assumes that the TPIRR's upgrade to a fully interoperable PTC system between 2011 and 2015 would require the TPIRR to incur additional expenditures equal to 25 percent of its original back office system investment.[342]

(b) PTC Wayside System

TPI's Opening Evidence relied on CSXT's costs of PTC related components but inexplicably omitted key components of wayside interface units and radios, resulting in a conceptually inaccurate and non-functional TPIRR "system." TPI also understated the number of wayside interface units and radios required for a fully functioning PTC system for the TPIRR. Although the CSXT PTC unit costs relied upon by TPI are from a different technological era and would not be valid for a 2010 installation, TPI provided no basis for its selective use of only a small subset of the required PTC components. The manner in which TPI selected and applied these costs is wholly inconsistent with what is necessary for a functioning PTC system. CSXT addresses TPI's shortcomings below.

Missing Wayside System Components: CSXT's Signals Engineering Experts have corrected TPI's cost omissions and developed costs for an integrated PTC system to be installed at all wayside control points, wayside signals, and tunnels. Moveable span bridges would be outfitted in the same way as control points, because from a signals perspective, those bridges are the same as control points. Details of CSXT's Signals Engineering Experts' proposed signal

342 Based on CSXT Engineering Experts review of the Board's rulings regarding SARR implementation of PTC in *DuPont* and *SunBelt;* the PTC system that CSXT is installing (whose costs and components TPI relied upon in its evidence) and its equipment, components and operations; the requirements of the RSIA and FRA regulations and standards for PTC systems by the end of 2015; their signals systems experience and expertise; and their knowledge of the state of development of PTC technology by real world railroads today, those Experts have determined that a reasonable estimate of the additional cost the TPIRR would incur to upgrade its 2010 system to 2015 RSIA standards for non-communications components is approximately 25% of the costs of installation of the original TPIRR CTC-with-PTC capabilities system. As discussed below, for communications systems and components, the majority of TPIRR expenditures would be made during the 2011-2015 period, to upgrade the TPIRR system to RSIA-2015 standards. *See infra* III-F-6-b-(ii)-(g).

configuration for the TPIRR are set forth in CSXT's Reply work papers.[343] CSXT's work papers also include unit costs for these components at mid-2010 price levels and include all of the components and installation labor necessary for a fully functioning PTC system.[344]

Wayside Interface Units: TPI included cost for wayside units only at intermediate signal locations and failed to provide for any wayside communications capabilities at either intermediate signal locations or at interlockings.

To supply intermediate signal locations with PTC wayside interface units, TPI applied CSXT's average estimated cost for installing wayside interface units on all of its intermediate signal locations. CSXT accepts TPI's approach for estimating the cost of installing wayside interface unit hardware at intermediate signal locations. CSXT notes that its internal cost estimate for wayside interface units at intermediate signal locations did not include the separate costs required to allow the wayside interface units to communicate with other components of the TPIRR PTC system.[345]

For wayside interface units at TPIRR interlockings, TPI asserts simply that "WIUs are considered built in as an inherent part of the vital microprocessor equipment" and does not include any additional PTC investment. *See* TPI Opening III-F-49. TPI has not demonstrated that its interlocking unit costs, which are based on quotes from GE Transportation Systems Global Signaling from 2005, include costs for the required wayside interface unit. CSXT produced in discovery two different types of wayside interface unit costs for interlocking—those for external installations that are not equipped with the internal microprocessor equipment

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[343] *See* CSXT Reply WP "TPI Signals & Communications CSXT Reply.xlsx."

[344] *See id.*

[345] On Reply, CSXT has included these necessary costs, which are reported separately with CSXT's estimates of costs of PTR radios and antennae, and related development costs. *See infra* III-F-165.

needed to accommodate a wayside interface device and require instead external mounting of the wayside interface unit; and those for internal wayside interface unit installations applicable to the more modern interlocking signal huts like those referenced in the quote used by TPI. Specifically, the cost estimates for the "internal" locations are for those interlockings where CSXT has a signal hut that, like the signal huts assumed to be installed by TPI, have circuits and vital microprocessor equipment, but still require installation of wayside interface units to achieve PTC functionality. Adopting the approach used by TPI for calculating the wayside interface unit cost for intermediate signal locations, CSXT calculates from the materials it produced in discovery an average wayside interface unit installation cost of $24,475 per internal interlocking hut location, which it has applied to all control points on the TPIRR.[346]

PTC Radios and Antennas: TPI included a cost of {{ }} for each PTC-outfitted intermediate signal location and interlocking for a radio and antenna. TPI derived that cost from documents provided by CSXT in discovery. There are two problems with TPI's proposed costs. First, the costs selected by TPI from CSXT discovery materials are for a 220 megahertz radio and the associated antenna.[347] However, an industry standard 220 megahertz radio had not yet been developed in 2010 and, in fact, is still not available today. Therefore, TPI may not assume that such a non-existent radio would be available for installation on the TPIRR. Second, TPI ignored a number of critical cost components necessary to render the intermediate signal locations and interlockings communications capable. These costs were clearly set forth in the

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[346] *See* CSXT Reply WP "CSXT PTC Unit Costing Detail CSXT Reply.xlsx," Tab "Signal Installs & WIU Count."

[347] *See* TPI Op. WP "CSXT PTC Unit Costing Detail.xlsx" Tab "Wayside Comms Detail," at cells D36:D37 and D58:D59.

CSXT discovery materials and include items such as batteries, battery chargers, installation labor and material shipping and taxes.[348]

In this Reply Evidence, CSXT rejects TPI's assumption that 220 megahertz radios and antennas could be installed by the TPIRR at the outset, and includes instead costs for a standard radio and its associated mast and antenna kit.[349] CSXT also has added the other necessary component costs ignored by TPI. CSXT also assumes that the cost to install the 220 megahertz radios, which represent the industry standard to meet the 2015 interoperability requirements and the associated antennas would be incurred by the TPIRR in 2015 to meet interoperability standards. Details of CSXT's development of wayside communications related costs for intermediate signal locations and interlocking are set forth in its reply workpapers.[350]

(c) PTC Locomotive Costs

TPI assumed that the TPIRR would incur a cost of approximately {{ }} to outfit each TPIRR locomotive with PTC capability. CSXT's Signals Engineering Experts accept this figure, but reject TPI's assumption that the TPIRR would need to outfit only its own locomotive fleet to be compatible with its PTC system. TPI's operating plan assumes that its locomotives would be used in run through service with its interchange partners and that carriers providing locomotive units to the TPIRR would be compensated for the time those foreign carriers' locomotives spend on the TPIRR, based on existing horsepower hour equalization agreements.[351] This means that in order for the TPIRR PTC system to be functional, locomotives received in

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[348] *See* Discovery Document "PTC Unit Costing Detail.xlsx."

[349] *See* CSXT Reply WP "TPI Signals & Communications CSXT Reply.xlsx," Tab Components & Tabulation," Lines 58, 67, and 68.

[350] *See* CSXT Reply WP "TPI Signals & Communications CSXT Reply.xlsx" and "CSXT PTC Unit Costing Detail - CSXT Reply.xls."

[351] *See* TPI Opening III-C-7-8, III-C-16.

interchange service from the residual CSXT and other TPIRR interchange partners would also need to be outfitted with PTC capability.[352]

To determine the number of locomotives that the TPIRR would need to equip with PTC capabilities, CSXT queried the train event data it produced in discovery to determine the number of unique locomotives used on TPIRR trains in the Base Year. CSXT identified an overall total of 11,423 unique locomotives that traversed the CSXT line segments assumed to be replicated by the TPIRR in the Base Year. CSXT reduced this figure based on an assumption that some effort would be made by the locomotive scheduling personnel of TPIRR and its connecting carriers to marshal PTC-outfitted locomotives for transit over the TPIRR. Consistent with this assumption, CSXT determined that only the number of locomotives appearing on at least three distinct trains on the lines replicated by the TPIRR would need to be equipped for PTC. CSXT also removed from the count locomotives with less than 3,000 horsepower because they are not typically involved in road service. Based on those assumptions, CSXT determined that a total of 7,354 locomotives would need to be outfitted with PTC equipment in the Base Year in order for the TPIRR PTC system to be fully functional.

CSXT also rejects TPI's assumption that the locomotive radios TPIRR would install in 2010 would be capable of meeting 2015 RSIA interoperability standards. Such radios are still being developed and refined today. CSXT has added costs in 2015 to replace the locomotive radios with radios that meet the interoperability requirements, but only for TPIRR locomotives.

[352] It is necessary to outfit all locomotives operating over the TPIRR with PTC capabilities because according to TPI, based on its discussions with the designer and developer of the RTC simulation model, the dispatch logic of the RTC most closely simulates the communications of a PTC system where there are no active signals within the model. As such, TPI has disabled any signal logic in its RTC model runs consistent with its assumption of a fully functioning PTC system for the TPIRR. The outputs of the PTC enabled RTC runs form the basis of TPI's operating statistics for the Base Year.

CSXT assumes the radios for foreign locomotives used in run-through service on the TPIRR would be replaced by the owners of those locomotives as part of those carriers' efforts to meet the 2015 interoperability standards.

(d) PTC Technical Development and Support

CSXT provided to TPI in discovery its estimates of the cost for information technology components of the PTC system, which are shown in Table III-F-20 below.

Table III-F-20
CSXT PTC Technical Development and Support{{

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As a first mover in implementing a workable PTC system for a major freight railroad, TPI would incur significant costs for development and testing of system components, design of the communications backbone and back office network, and acquisition of the necessary spectrum, among other things. TPI failed to include any of these costs in its evidence.

Notwithstanding TPI's cites to PTC-like systems that may have been in operation prior to mid-2010, the PTC system configuration specified by TPI calls for a "standard CTC-based vital signal system with components added to provide Positive Train Control." *See* TPI Opening III-F-47. This is not the ACSES, ITCS or ICBS systems cited by TPI.

ACSES, or Advanced Civil Speed Enforcement System, is a positive train control cab signaling system. The system is designed to prevent train-to-train collisions, protect against overspeed and protect work crews with temporary speed restrictions. The information about permanent and temporary speed restrictions is transmitted to the train by transponders lying in the track, coded tracks and digital radio. Amtrak has deployed ACSES on its Northeast Corridor property. Even though it is operating on an Amtrak corridor, the ACSES system is limited due to its high cost and inability to interoperate with other PTC systems, as required by the RSIA.

ITCS, or Incremental Train Control System, is a communication-based signaling system overlaid on an existing signal system. This was designed to prevent train collisions and overspeed derailments. The main function of the system is to enforce signal authorities, civil speeds and temporary speed limits. It was designed as a vital overlay to an existing CTC system with a wireless network of computer servers. These servers communicate with the equipped locomotives through the communications system consisting of a UHF radio network. The ICTS train tracking system is based on a Global Positioning System ("GPS"). The wireless ITCS systems on Amtrak's Michigan Line was still not functioning reliably in 2007 after 13 years of development.

ICBS stands for Interoperable Communications-Based Train Control System, an initiative backed by the FRA to enhance interoperability and signaling procurement in the railway system of the United States by creating a single national standard for train control and command systems. The concept was launched in 2005 and an interoperable prototype system was demonstrated in January 2009.

A workable PTC deployment requires that locomotives communicate effectively and reliably with the PTC back office. Many of the issues and challenges with which railroads are grappling today concerning radio frequency and communications and back office architecture would need to be resolved by the TPIRR. As TPI acknowledged,[353] the answers were not available on-the-shelf and substantial development and testing efforts would have to be undertaken by the TPIRR. Indeed, CSXT continues to incur substantial PTC development costs today, four years after the TPIRR would begin operations. Table III-F-19 summarizes estimated PTC development costs that the TPIRR would need to incur in advance of deploying its own PTC system in mid-2010.

TPI failed to include any of these costs in its estimate. CSXT's Signals Engineering Experts assume the TPIRR would incur the same costs as CSXT for all PTC deployment and support elements, scaled to the ratio of TPIRR route miles of PTC to route miles of CSXT's planned deployment of PTC.[354] TPI's RTC model assumes that TPIRR trains would operate over 7,357 PTC equipped route miles or 62.9% of the 11,697 route miles CSXT identified in discovery as qualifying for PTC.

[353] *See* TPI Opening III-F-49.

[354] *See* Discovery Document "PTC Capital Spend by State Update.xlsx."

To comply with 2015 RISA interoperability standards and in conjunction with efforts of other carriers, CSXT's Signals Engineering Experts assume that the TPIRR would incur as an additional expenditure 25 percent of its initial PTC development and support cost, from the 2011 through 2015 time frame. The resulting TPIRR PTC IT Deployment costs are summarized in Table III-F-21.

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(e) PTC Testing

In order to ensure safe and effective operation of the critical features of its positive train control system, the TPIRR, like the carriers implementing PTC today, would be required to invest heavily in testing its newly implemented system. CSXT produced in discovery reports of its PTC related testing expenditures from 2009 through 2013, summarized in Table III-F-22 below.

Table III-F-22
CSXT PTC Testing {{

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TPI did not include any costs for testing TPIRR PTC components or system, either prior to installation as part of the PTC development phase or after installation to ensure safe and effective operation. CSXT's Reply corrects this omission by including testing costs for both 2010 and the 2011 to 2015 time frames. CSXT's Signals Engineering Experts assume the TPIRR would incur the same costs as CSXT for all PTC testing, again scaled to the proportion of TPIRR route miles of PTC to those of CSXT's planned deployment.

To comply with 2015 interoperability standards in conjunction with efforts of other carriers, CSXT assumes that the TPIRR will incur as an additional expenditure 25% of its initial PTC testing spend over the 2011 through 2015 time frame. Table III-F-23 sets forth CSXT's development of PTC testing costs for the TPIRR.

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(f) GIS

TPI included an estimate for GIS as part of its initial PTC investment. Although TPI's GIS cost is derived from materials produced by CSXT in discovery, TPI misinterpreted those data in a manner that understates cost for the TPIRR. Specifically, TPI converted CSXT's GIS cost to a cost per track mile assuming (based on information provided by CSXT), 23,500 total track miles. TPI then multiplied this cost per track mile by the TPIRR constructed route miles. To make the measure consistent, CSXT multiplied the cost per track mile by the total track miles for the TPIRR.[355]

CSXT assumes that the TPIRR will not incur any additional GIS related expenditures over the 2011 through 2015 time period to meet RISA compliance standards.

(g) PTC Communications

In order to ensure uninterrupted communication between the PTC system and locomotives moving on the TPIRR system, like the carriers implementing PTC today, the TPIRR would be required to invest heavily in a communications backbone and back office systems for its PTC system. CSXT produced in discovery details of its PTC related communications expenditures over the 2009 through 2013 time frame as set forth in Table III-F-24 below.

[355] *See* CSXT Reply WP "PTC Development Costs for TPIRR in CSX Reply Evidence.xlsx."

Table III-F-24
CSXT PTC Communications {{

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TPI did not include any costs for a PTC communications system and provided no explanation of how the TPIRR would address this critical aspect of a functioning PTC system. CSXT's Reply includes communications costs for both the 2010 and the 2011 to 2015 time frames. CSXT's Signals Engineering Experts apply a reverse assumption for TPIRR expenditures for PTC communications, assuming the TPIRR would incur 25% of the projected CSXT cost for all PTC communications at the outset, again scaled to the proportionate size of the TPIRR system. CSXT then assumes that the TPIRR, in conjunction with other railroads striving to meet the RISA compliance standards, would incur 100% of the projected CSXT communications spending, (scaled by the relative TPIRR route miles of PTC), over the second, 2011-2015 time period. Table III-F-25 sets forth CSXT's development of PTC testing costs for the TPIRR.

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c. Communication System

TPI posits a communication system based on microwave radio technology and Land Mobile Radio technology. CSXT's Signals Engineering Experts accept this general system design, but adjust the layout and distribution of microwave towers to correspond to the route configuration of the TPIRR. Additionally, CSXT's Experts developed documented costs for various components that are required for an operating communications system.

TPI developed its count of microwave towers based on a blanket assumption of 20-mile spacing across the TPIRR network's 6,866 routes miles.[356] TPI made no effort to identify where its towers would be located. While CSXT's Engineering Experts accept that 20-mile spacing generally is reasonable, TPI' s use of an undifferentiated simple average fails to account for complexities and necessary requirements for a workable rail communications system.

In the first instance, microwave communications technology uses line-of-sight transmission between locations. Microwave communications do not bend around obstacles nor go through them. A line of sight, without obstacles such as buildings, trees, or terrain, must be established between each microwave tower site. TPI's general 20-mile average spacing assumption does not account for necessary microwave towers through differential terrain (hills, mountains, curves, etc.) or the need to extend radio coverage to the end of TPIRR lines regardless of the length of the last segment. Nor does it account for situations and conditions in which intersecting rail lines require spacing closer than 20 miles. CSXT's Signals Engineering Experts have addressed these shortcomings by analyzing the actual TPIRR route using GIS software to determine where towers would need to be placed. CSXT's Signals Engineering Experts used a 20-mile tower spacing convention unless specific conditions of the TPIRR route (*e.g.*, mountainous terrain and city centers) require otherwise.[357]

TPI asserted that its microwave towers were tailored to be multi-directional as necessary to meet the requirements of the TPIRR route configuration, but its cost estimate used only microwave towers with the equipment to face one direction.[358] Further, TPI's towers used one

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[356] 6,866 route miles/20 mile average spacing = 344 towers proposed by TPI (rounding up).

[357] *See* CSXT Reply WP "TPIRR Microwave Towers.kmz."

[358] *See* TPI Opening III-F-53 and TPI Op. WP "TPI LMR Cost Development.xlsx," Tab "Communications Equip."

antenna, whereas two are required to separately receive and transmit data under TPI's design. TPI's single tower design also failed to account for two-way towers (intermediate towers), three-way towers, or four-way towers that are required to provide coverage to the entire TPIRR route (*e.g.*, at junctions, interchanges, and other locations where TPIRR lines going in three or more directions).

To correct TPI's erroneous microwave tower configuration, CSXT added a set of microwave equipment and two corresponding antennas to account for the directional point to point line-of-sight microwave communications paths required and where TPIRR lines diverge.[359] CSXT also determined the number of each type of tower that is required to cover TPIRR's route configuration given real-world topography and obstacles. These corrections result in the following number of microwave tower sites: twenty-one (21) one-way towers (end of line), three hundred thirty-seven (337) two-way towers (intermediate), twenty-five (25) three-way towers, and four (4) four-way direction towers. This correction increases the TPI tower count by forty-three (43) and adds the corresponding equipment required to support the directional point to point microwave communications paths.

TPI also either omitted or incorrectly accounted for a number of the costs of components that comprise a microwave tower, antenna, or link equipment, an LMR base station, multiplexor or repeater, a communications shed, and other radio components.[360] TPI's workpapers listed source documents for each component, but not all were included in its evidence. CSXT requested that TPI provide the supporting documentation. In response, TPI provided documentation that revealed it had excluded costs of necessary components and misapplied

[359] *See* CSXT Reply WP "TPIRR Microwave Towers.xlsx."

[360] *See* TPI Op. WP "TPI LMR Cost Development" for a list of components without cost documentation.

prices set forth in those documents. To develop accurate costs, CSXT applied costs stated in the supporting documents to corresponding items. Where TPI's designs omitted necessary components, CSXT added them, using prices from TPI's documentation where possible, and used price quotes obtained from outside vendors. Based on their review of TPI's documentation and calculations, CSXT's Signals Engineering Experts determined the following corrections were required:

Microwave Radio: TPI used a cost of $27,850 for a microwave base station, whereas the documentation it provided in response to CSXT's request for missing materials showed a cost of $38,433.[361] CSXT corrected these prices to confirm to TPI's documentation.

Microwave Antenna: TPI's calculations used a cost of $1,473 for a polarized parabola and feed horn, but the documentation it provided in response to CSXT's request showed a cost of $1,987. CSXT corrected this omission to be consistent with TPI's documentation.[362] TPI also neglected to include the antenna Mount Assembly for $134.40 per antenna as listed with the antenna materials. CSXT corrected this price to be consistent with TPI's documentation.[363]

Land Mobile Radio (LMR): TPI's calculations used a cost of $3,858 for a base station, whereas the documentation it provided in response to CSXT's request for missing materials showed a cost of $4,469. CSXT corrected this price to be consistent with the documentation.[364] Additionally, TPI's documentation shows that the base station it selected does not include all

[361] *See* CSXT Reply WPs "S&C Workpapers 3.pdf" page 6 and "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Communications Equip.," at Lines 16, 23, 30, and 37.

[362] *See* CSXT Reply WP "S&C Workpapers 3.pdf" page 65 and "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Communications Equip.," at Lines 48, 53, 58, and 63.

[363] *See* CSXT Reply WP "S&C Workpapers 3.pdf" page 65 and "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Communications Equip.," at Lines 49, 54, 59, and 64.

[364] *See* CSXT Reply WP "S&C Workpapers 3.pdf" page 61 and "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Communications Equip.," Line 68.

necessary components for a functional LMR. Although these components are listed in TPI's base station cost documentation, TPI's cost calculations excluded them. These items include an X530, CAI equipment, an antenna relay, Omni antenna, coax connectors, cabinet, and a battery charger. CSXT has added costs for these required components.[365]

Desktop Controller: TPI used a cost of $417 for a Desktop Controller, but the documentation it provided in response to CSXT's request showed a cost of $490. CSXT corrected this price to be consistent with TPI's documentation.[366]

Multiplexor Equipment: TPI did not include the cost for a BRI data card which, TPI's documentation includes as part of the suite of items required for a functioning multiplexor unit.[367] CSXT has added costs for this item.

Microwave Tower: TPI used a cost of $59,372 for a 200-foot tower, whereas the documentation it provided in response to CSXT's request for missing materials showed a cost of $74,216.[368] CSXT corrected this price to be consistent with TPI's documentation.[369] Additionally, TPI failed to include costs for several necessary components of a microwave tower site. First, TPI omitted the cost for the foundation required for a 3-leg self-supporting tower

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[365] *See* CSXT Reply WP "S&C Workpapers 2.pdf" pages 4 and 5 (Motorola/Texas Youth Commission) and "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Communications Equip.," Lines 69 to 77.

[366] *See* CSXT Reply WP "S&C Workpapers 3.pdf" page 61 and "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Communications Equip.," Line 79.

[367] *See* CSXT Reply WP "S&C Workpapers 3.pdf" page 33 and "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Communications Equip.," Line 93.

[368] TPI applied a 20% reduction to the documented price without explanation. *See* TPI Opening WP "TPI LMR Cost Development.xlsx," Tab "Per Tower Equipment," cell H39.

[369] *See* CSXT Reply WP "S&C Workpapers 6.pdf" at page 196 and "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Per Tower Equipment," Line 44.

structure. CSXT added the costs for an 8x8 footing with concrete piers to support the tower.[370] CSXT developed costs for these items.[371] Second, TPI did not provide fencing to secure its microwave sheds. It is standard practice to provide fencing due to the high-value equipment at the site and dispersed and isolated tower locations. CSXT developed costs for these items using a line-item estimate.[372] Third, TPI reduced with cost for 7/8" Standard Coax (foam) by 65 percent without providing a justification or explanation of why. CSXT instead uses the cost provided in TPI's workpapers.[373]

Communications Shed: Finally, TPI's development of the cost of a communication shed omitted several necessary components, including shed footings/foundation, an alarm system to protect against fire and intrusion and a halo ground system to properly ground the shed and internal equipment from lightning strikes. CSXT developed costs for these items using a line-item estimate.[374]

Based on the changes discussed above, the corrected cost for TPIRR microwave communications is $378.5 million in CSXT's reply evidence, compared to TPI's opening cost of $282.8 million.

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[370] *See* "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Per Tower Equipment," Line 35.

[371] *See* CSXT Reply WP "Tower and Shed Estimate.pdf."

[372] *See* CSXT Reply WP "Tower and Shed Estimate.pdf." *See* "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Per Tower Equipment," Line 36.

[373] *See* CSXT Reply WP "SC Workpapers 6.pdf," at 211 ("Radio Frequency System").

[374] *See* CSXT Reply WPs "TPI LMR Cost Development CSXT Reply.xlsx," Tab "Shed," Lines 24 to 29 and "Tower and Shed Estimate.pdf."

7. Buildings and Facilities

TPI's Opening Evidence included investment for certain major system facilities at 12 of the TPIRR's major yards.[375] These facilities include the TPIRR's headquarters building, crew facilities, locomotive repair shops, 1,000- and 1,500-mile inspection facilities, and car and locomotive storage. Additional facilities, such as crew and maintenance-of-way facilities, are located at some of the TPIRR's smaller yards located throughout the TPIRR system. *See* TPI Opening III-F-55. CSXT's Engineering Experts have reviewed TPI's opening narrative and supporting workpapers and, in conjunction with CSXT's Operations Experts, identified a substantial number of facilities that the TPIRR would require but that TPI did not include in its evidence. In addition, CSXT's Engineering Experts have identified errors and omissions in TPI's development of the necessary components for a number of facilities and in the buildup of the associated costs.

CSXT's Engineering Experts largely accept TPI's itemized building and facilities categories and have added other types of essential facilities not constructed by TPI. For the TPIRR headquarters, locomotive repair and inspection facilities assumed by TPI, CSXT's Engineering Experts accepted where feasible and practical many of the costs proposed by TPI. Where necessary, CSXT has corrected TPI's cost estimates for components of facilities where TPI's estimates were overly simplified, missing elements and/or not representative of the construction standards, practices and materials associated with such facilities. In addition to the facilities structures themselves, CSXT's Engineering Experts identified significant flaws in TPI's

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[375] This section III-F-7 is sponsored by Michael Baranowski, Mark Peterson, and Robert Phillips. The qualifications and experience of Messrs. Baranowski and Phillips are detailed elsewhere in this Section III-F, and in Section IV *infra.* Mr. Peterson is STV's Vice President and an experienced architect. He has experience with multiple freight rail projects. His qualifications and experience is further described in Section IV *infra.*

paving cost estimates regarding both the areas to be paved and the specified paving cross section, particularly in specific areas of intermodal terminals. Below, CSXT's Engineering Experts identify and explain the shortcomings in TPI's building and facilities, explain the basis for their proposed corrections and provide corrected costs. A summary of the differences between TPI's proposed TPIRR facilities investment and CSXT's corrected investment costs for those facilities is are set forth in Table III-F-26 below.

Table III-F-26
Comparison of TPI Opening and CSXT Reply TPIRR Facilities Investment

Facility	TPI Open	CSXT Reply	Difference
1. Headquarters Building	$16,753	$35,152	$18,399
2. Fueling Facilities	$33,397	$47,900	$14,503
3. Locomotive Shops	$90,277	$261,768	$171,491
4. Car Repair Shop	$0	$0	$0
5. Crew Change Facilities (Small & large)	$14,281	$14,281	$0
6. Yard Offices (Small & Large)	$17,504	$33,908	$16,404
7. Roadway Buildings (MOW)	$14,158	$19,987	$5,829
8. Guard Booths	$856	$856	$0
9. Yardmaster Towers	$2,609	$8,920	$6,311
10. Diesel S&I	$0	$0	$0
11. In Gate	$0	$14,876	$14,876
12. Out Gate	$0	$14,501	$14,501
13. Maintenance Pad	$0	$1,472	$1,472
14. Hostler Fueling Area	$0	$6,223	$6,223
15. Air Compressor Bldg.	$0	$7,622	$7,622
16. Hostler Office & Welfare Bldg.	$0	$2,019	$2,019
17. Vehicle Service & Repair Bldg.	$0	$5,751	$5,751
18. Other Facilities/Site Costs	$795,010	$970,076	$175,066
19. Total Buildings and Facilities	$984,845	$1,445,313	$460,468

In the remainder of this section CSXT's Engineering Experts address each specific type of facility the TPIRR would require.

a. Headquarters Building

TPI located the headquarters for the TPIRR at its Tilford Yard in Atlanta, GA. *See* TPI Opening III-F-56. CSXT accepts TPIRR's headquarter building location. CSXT adjusts the size of the headquarters building to accommodate the TPIRR executive and administrative personnel needed to efficiently run a railroad the size of the TPIRR as set forth in Section III-D. Specifically, TPI sized its headquarters building to accommodate its general and administrative and non-train operating personnel. For its Reply, CSXT has determined that the TPIRR will require almost 2,000 general and administrative and non-train operating personnel positions and has increased the square footage of the headquarters building accordingly.

CSXT accepts TPIRR's headquarters unit costs with one minor addition. TPI included costs at TPIRR's headquarters building for 80 lockers and 10 benches. However, TPI did not include the space required to accommodate these items. CSXT provided two 20'x 20' (400 square feet each for male and female) spaces in order to accommodate both male and female lockers.[376]

b. Fueling Facilities

TPI assumed that the TPIRR would have large fixed fueling platforms, consisting of eight fueling stations, at each of the TPIRR's 12 major yards. It assumed smaller fixed fueling platforms, consisting of four fixed fueling stations, at four other yards on the TPIRR. TPI assumed that locomotive servicing (replenishment of lubricating oil and sand) would also take place at all 16 of those fueling facilities. TPI's operating plan also designated fifteen locations where facilities are provided for locomotive fueling by trucks (*i.e.*, direct-to-locomotive ("DTL")

[376] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tab "Headquarters."

fueling). TPI assumed locomotive servicing would also occur at DTL fueling locations.[377] TPI Opening III-F-56-7.

Although TPI failed to explain this in its narrative, the Complainant developed its costs for the TPIRR fixed fueling facilities from a combination of CSXT AFEs provided in discovery, R.S. Means data, and price quotes from various vendors. The AFE was from a recent CSXT upgrade of its locomotive fueling service center in Atlanta, GA and includes costs to upgrade locomotive fuel, sand and lubricants delivery systems. TPI relied on vendor quotes for tankage, truck spillage containment equipment, oil water separators, and fuel pan costs. TPI used R.S. Means costs for portions of the oil/water separation pond lining. With the exception of fuel pans, fuel tanks, and the lack of concrete infrastructure necessary to support added AFE items, CSXT accepts TPI's fixed locomotive fueling facility and oil water separator systems unit costs as the starting point for the costs of these facilities for the TPIRR. CSXT's Engineering Experts also add necessary fixed fueling facility components not covered by the CSXT Atlanta facility upgrade AFE or otherwise accounted for by TPI. These consist primarily of fuel platform, foundation costs and associated embedded rail costs. CSXT's Engineering Experts developed details for these components from the San Joaquin Regional Rail Commission ("SJRRC") Equipment Storage and Maintenance Facility project conducted in Stockton, CA.[378]

CSXT rejects as inadequate TPI's provision of only two 25,000 gallon fuel tanks at each of the two types (4- and 8- spot) of TPIRR fixed fueling facilities and no storage tankage for fuel additives, lube oils or waste oils. TPI provided no explanation of how it determined the number and size of storage tanks required. TPI's proposed tankage is severely inadequate. Reasonably

[377] According to TPI, the yard tracks where the TPIRR would conduct locomotive fueling by truck would be built on 25-foot track centers, thereby providing sufficient space for the trucks to operate.

[378] *See* CSXT Reply WP "CSXT Cost Estimate Worksheets.pdf," part one.

assuming a typical locomotive holds approximately 4,500 -5,000 gallons of fuel, TPI's proposed tank size would mean only 10-11 locomotives could be filled at the TPIRR fueling facilities before the tanks would have to be replenished.[379] Without significantly greater fuel reserve capacity in the tanks, TPIRR fueling operations would be hindered and inefficient because fueling activity would be halted once the tanks run out and remain idle until the fuel tanks could be refilled.

TPI based its cost for the TPIRR fueling facilities on costs actually incurred by CSXT to upgrade its existing eight spot fueling facility in Atlanta.[380] The project costs included installation of a new sand storage silo and sand conveying system, heated inverted overhead boom cabinets, a central vacuum system, a new service platform lighting, a new air compressor system for sanding and replacement of all pumping and control systems.[381] The upgrade did not include any costs for tankage.

CSXT also produced in discovery, in response to TPI discovery requests, a diagram of its Atlanta Tilford Yard tankage.[382] That document shows a total of six liquid storage tanks at the CSXT Atlanta fueling facility. These are two 150,000 gallon fuel storage tanks, one 20,000 gallon lube oil tank, one 12,000 gallon fuel additives tank, and two 2,000 gallon used oil storage tanks.

In its Reply, CSXT accepts TPI's assumed cost for fueling facility apparatus based on CSXT's Atlanta upgrade experience, but rejects TPI's two 25,000 gallon storage tanks and adds instead costs for the six tanks identified by CSXT in discovery as currently existing at the

[379] (25,000 x 2)/5000 = 10; (25,000 x 2)/4500 = 11.1.

[380] *See* TPI Open WP "Fixed Fueling Station.pdf"

[381] *Id.*

[382] *See* CSXT Reply WP "Atlanta Fuel Tanks.png"

Atlanta facility. CSXT has added costs for such tankage at all of the TPIRR eight-spot fueling locations. For the TPIRR's smaller four spot fueling locations, CSXT reduces the fuel storage, fuel additive and waste oil tankage by half.

CSXT's fueling facility tankage requirements are conservative. In response to TPI Request for Production No. 91, CSXT produced a spreadsheet identifying tankage capacities at existing CSXT fueling facilities. CSXT has included in its reply work papers a version of the spreadsheet highlighted to identify existing CSXT locations where CSXT in its reply has determined the TPIRR will also require locomotive fueling capabilities.[383] That spreadsheet shows that a number of locations at which the TPIRR will require locomotive fueling capabilities have tankage capacity substantially greater than the tankage at Atlanta, making CSXT's assumption that all eight spot fueling locations would have tankage comparable to that at Atlanta conservative.[384]

CSXT rejects TPI's assumed use of fuel pans to capture spillage in permanent fueling platforms. While fuel pans can be used effectively as a temporary measure in yards or other locations where some protection is needed, they are inadequate for fixed locomotive fueling facilities. So called track pans are made of either steel or fiber reinforced plastic and are designed as environmental protection for areas where locomotives are staged (parked) for periods of time, generally in excess of 20 minutes. Due to their relatively light duty construction they cannot withstand the rigors of a fixed fueling facility and over time will get damaged and rendered useless. Further, because these units are typically 20-feet long and come in three sections (two outboard of the rail and one centered between the rails) they do not have the spill

[383] See CSXT Reply WP "Third Party Fueling Update.xls"

[384] For example, at Selkirk, NY, CSXT has over two million gallons of tankage. At Waycross, GA, CSXT has over 800,000 gallons of tankage.

containment capacity necessary to ensure adequate containment. While they can be used for Direct-to-Locomotive ("DTL") fueling, the volume of fuel dispensed at a fixed fueling facility is much greater and would quickly overwhelm the capacity of the track pan. Track pans also present slip-trip-and-fall hazards that are not acceptable in a fixed fueling facility where inspection and minor repair activities are common. DTL fueling is typically performed by a contractor whose sole interest is fueling the locomotive; the contractor only moves between the fueling point and the fuel truck. At a fixed fueling facility, coolant, lubrication, sanding, and toilet service all require safe movement around the locomotive and the service personnel's eyes are frequently focused on tasks that make solid even footing an essential safety feature that track pans, by virtue of the fact that they drop off from the surrounding surface by four inches, cannot offer. Lower level routine operations such as various fluid (water, coolant, engine oil, etc.) and sand refill, toilet service (in "short hood" locomotives), undercarriage visual inspections of wheels, axels, and brakes required by FRA regulations (49 CFR Pt. 229.21, daily inspections) are all performed during locomotive fueling. Visual inspections are performed during fueling to identify present or potential problems with the locomotive at least once during each day. Any problems detected would be escalated to a designated Diesel Service and Inspection facility or a locomotive heavy repair shop, depending on the nature and severity of the problem. Because the primary purpose of the fixed fueling platform is fueling, there is only a short amount of time available to make any minor repairs, in order to avoid interfering with fueling operations. In order to facilitate inspections, CSXT accepts TPI's 4- and 8-spot fixed fueling configuration but adds necessary platform concrete with embedded tracks. Other added components include concrete service foundations and adequate platform length and width.[385]

[385] *See* CSXT Reply WPs "TPIRR Facilities CSXT Reply.xlsx," Tab "Fixed Fueling Platform."

CSXT accepts most of TPI's assumptions related to its development of costs for the TPIRR DTL fueling facilities. CSXT rejects TPI's asphalt specification as inadequate to accommodate the heavier load of DTL fuel trucks. CSXT substitutes a heavier industrial asphalt section necessary to accommodate the heavier loads for TPI's calculated quantities.[386]

c. Locomotive Shops

TPI included locomotive shops for the TPIRR at Willard, OH, Cumberland, MD, Nashville, TN, and Waycross, GA. CSXT accepts this assumption. According to TPI, each locomotive shop is assumed to handle larger overhaul work as well as 92-day inspections and running repairs. *See* TPI Opening III-F-57. TPI posited that each shop would include a two-track facility designed to handle 92-day inspections and other minor running repairs as required. TPI also stated that it included three additional tracks capable of holding up to ten (10) locomotives for the larger overhaul work. TPI posited that the heavier work-track design would include overhead and jib cranes, drop tables, and other necessary heavy equipment based on the function of each track. In addition, TPI states that each shop would be equipped with a wheel turning machine and other heavy equipment. *See id.*

TPI based its locomotive unit costs and designs on a cost per square foot developed from bid prices for a combination locomotive shop and office building for the Connecticut Southern Railroad received by its engineering consultant Crouch Engineering. According to TPI, it developed costs for additional items and equipment not included in the cost per square foot from manufacturer quotes and material CSXT produced in discovery, and added those costs to the TPIRR locomotive shop cost. *See* TPI Opening III-F-54.

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and WP "CSXT Cost Estimate Worksheets.pdf" under "1-Fixed Fueling Platform."

[386] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "Yard Unit Costs References" and "Yard Pavements and Fence Costs."

TPI's locomotive shop design and costs failed to include and account for all of the tracks described in its narrative. Specifically, TPI's narrative explains the need for a total of five tracks, but the locomotive floor plan that forms the basis of its locomotive shop cost estimate included only four tracks.[387] On Reply, CSXT has reconfigured the TPIRR locomotive shops to conform to TPI's narrative. As TPI's narrative specified, CSXT's revised locomotive shop design provides for three tracks capable of accommodating up to 10 locomotives for heavy repairs and overhauls along with two tracks outfitted to perform 92-day inspections.[388]

CSXT rejects TPI's assumption that the costs for TPIRR locomotive shops would be consistent with those of a building constructed by the Connecticut Southern Railroad, a shortline that operates a total of 42 miles of owned and leased track. TPI has not explained how the costs for the much smaller Connecticut Southern Railroad combined locomotive shop and office facility are representative of the costs for major Class I locomotive repair facility. In fact, the requirements of the two are not comparable. The Connecticut Southern Railroad shop/office bid that TPI relies on was for a 70' by 150' base locomotive shop and an adjacent 32' by 103' office facility. TPI's proposed locomotive shop configuration for the TPIRR is approximately 201' long with an average width of approximately 320 feet with an adjacent office area measuring 32' by 140'.[389] The proportion of the locomotive shop represented by relatively low-cost office area for the Connecticut Southern facility is nearly four times greater than that of the proposed TPIRR layout as set forth in the following Table III-F-27.

387 *See* TPI Op. WP "Locomotive Shop Floor Plan.pdf."

388 *See* CSXT Reply WP "CSXT Cost Estimate Worksheets.pdf."

389 *See* TPI Op. WP "Locomotive Shop Floor Plan.pdf."

Table III-F-27
Comparison of Connecticut Southern Locomotive Shop and Office Complex Dimensions to TPIRR

Complex Component	Connecticut Southern	TPIRR
Locomotive Shop	10,500	64,320
Office Building	3,296	4,480
Total Square Feet	13,796	68,800
Relative % Office Building	23.9%	6.5%

By their very nature the operations on the Connecticut Southern cannot be compared with or extrapolated to the maintenance requirements of a large Class I railroad like the TPIRR. An indication of the magnitude of the burdens of maintaining a Class I railroad locomotive fleet is evidenced by an AFE for a new wheel truing machine at the CSXT shop in Selkirk, NY, relied upon by TPI for its TPIRR wheel truing machine cost. CSXT's justification for the expenditure is increased throughput of locomotives and wheel sets that the system requires to keep up with demand.[390] Unlike the Connecticut Southern Railway, the TPIRR would need to change out the engine on hundreds of long haul road locomotives every six to eight years. The difference in road mileage put on a Class I locomotive makes its maintenance needs different in kind from those of short lines like the Connecticut Southern. The increased volume and frequency of locomotive repair needs on the TPIRR requires shops that are highly efficient and able to withstand the frenetic pounding of repeated maintenance activities.

As with virtually any building type, the complexities of supporting the additional loads of larger structures outweigh the economies of scale of constructing larger buildings. CSXTs Engineering Experts explain that these added complexities necessarily add costs that stem from a range of factors including longer structural spans and heavier overall loading, longer distribution

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390 *See* TPI Op. WP "CEA 2010-201 - Selkirk Wheel True machine.doc."

runs for utilities from the primary source, and additional code requirements for exits and life-safety systems. In addition, the greater volume of activity in a large shop building mandates the use of industrial equipment, fixtures, and fittings that are not necessary in a small shop facility like that of the Connecticut Southern, which can deploy residential quality heating, ventilation, and air conditioning ("HVAC") and plumbing components to meet many of its needs.

Further, the Connecticut Southern Railroad repair facility does not have the same capabilities specified for the TPIRR shops. The 10,500 square foot facility is designed to accommodate a maximum of four locomotive or four freight cars and is not sufficiently fortified to support the specialized equipment required to perform locomotive overhauls.

Locomotive shops that can efficiently and effectively accommodate the workload specified by TPI generally cost in the range of $400 to $450 per square foot. TPI's cost, on the other hand, is slightly more than $100 per square foot. The Connecticut Southern shop provides very limited service functions to which TPI simplistically adds costs for other specialized equipment from CSXT AFEs. Because much of the equipment in the CSXT AFEs referenced by TPI is for replacement of existing CSXT systems, the required support infrastructure and foundations were already in place. Thus while drop tables and wheel truing machines are themselves expensive, their costs would be substantially higher if they were built from scratch and if the foundations and pits were not already in place. The pits and foundations require very complex concrete work and include associated power distribution, ventilation systems, and sump pump systems. None of these costs are captured in the AFEs relied upon by TPI.

In addition to missing costs for foundations and pits, TPI omitted the cost of worker platforms, fall protection systems, and exhaust extraction. Similarly, where TPI added some costs for other component equipment such as overhead cranes, jib cranes, wheel truing machines, and drop tables, it fails to account for the added structure necessary to accommodate and support that equipment. The addition of a 30-ton overhead crane to the Connecticut Southern building would require additional column and lateral load strength, which has to be transferred into foundations. Inspection pits, wheel truing machines and drop tables all add tremendous complexity to foundations and require specialized drain systems, including grinder pumps to assure reliable removal of spilled liquids (oil, water, coolant, etc.) to an industrial water processing system. By code, vehicle maintenance facilities are required to have not less than five air changes per hour.[391] The Connecticut Southern building quote used by TPI shows no evidence of systems to meet this standard, and shows no specialized equipment to exhaust fouled air or replenish it with adequate, heated, make-up air.

The foundation for a major locomotive shop typically constitutes the single largest expense for construction of that shop. TPI failed to demonstrate that its proposed locomotive shop would be able to accommodate combined extreme locomotive weights while accounting for the complexity of constructing the various service and equipment pits and the number of embedments required to support tracks and other equipment within the building. In fact, TPI's locomotive shop design and costs simply did not take into account these requirements. TPI also failed to include in its shops the costs for very expensive pedestal track, direct fix or embedded rail.[392] This specialized track would be required for more than 50% of the heavy repair facility shop track.

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[391] *See* ASHRAE Standard 62.1, Table 6-4. Repair Shops & Note A.

[392] *See* TPI Op. WP "TPIRR Facilities.xlsx," Tab "Loco Shop." Pedestal track is track that is raised on steel or concrete piers that are space roughly five feet on center. This configuration allows mechanics relatively free access to the sides and undercarriage of the locomotive for service activities. Direct fix or embedded rail is rail that has been structurally embedded in the shop floor slab with the top of rail flush with the surface of the concrete providing an even floor surface that reduces tripping hazards and allows wheeled vehicles to drive over the tracks.

CSXT's Engineering Experts have explained the shortcomings with TPI's reliance on the Connecticut Southern building and documented in their workpapers the complexities that drive the costs of properly fitted locomotive shops.[393] These workpapers highlight the complexities of locomotive shop design and construction and set forth the unique characteristics of foundations, superstructure cranes and equipment, heating and ventilating equipment, and industrial systems required to support locomotive maintenance and repair.

In addition to the need for more substantial foundations and service pits, two other elements of TPI's proposed locomotive repair facility would require expansion of the shop area square footage. First, CSXT accepts TPI's proposed two track configuration for the locomotive 92-day inspection and minor repair tracks. *See* TPI Opening III-F-97. TPI's locomotive repair shop floor plan, however, provides for only one track.[394] CSXT's Engineering Experts adjusted the floor plan of the TPIRR locomotive repair facility to accommodate the second 92-day inspection and minor repair track specified by TPI.[395] Second, TPI specified in its narrative that the TPIRR locomotive repair facilities include a drop table,[396] but the TPI locomotive repair shop floor plan did not indicate any drop table location, nor is there adequate available space within TPI's proposed floor plan to accommodate a drop table. CSXT's Engineering Experts determined that in order to accommodate a drop table, and still maintain adequate space to meet TPI's other specification of ten locomotive major repair spots for each shop, the proposed shop

[393] *See* CSXT Reply WP "CSXT Cost Estimate Worksheets.pdf," part one for photos.

[394] *See* TPI Opening III-F-57.

[395] *See* CSXT Reply WP "CSXT Cost Estimate Worksheets.pdf," part 2 for locomotive repair shop floor plan."

[396] Drop tables are employed to lower motor wheelsets (also known as combos) and trucks from locomotives and other railroad vehicles. It is in essence an elevator-like machine that supports the vehicle and the lowers the truck or wheelset, moves it horizontally out from underneath the shadow of the locomotive and then raises it to floor level where it can be moved by crane or forklift to a repair shop or truck.

building would have to be extended by 25 feet to allow adequate space to properly position the front and rear trucks of road locomotives over the drop table and wheel truing machines.[397]

Finally, because the ability to efficiently repair locomotives depends on locomotive mechanics having unfettered access to all areas of the locomotive—most importantly the lower drive gear and trucks—the locomotive track pits must extend outward from the rail on both sides. Platforms needed to provide access to upper portions of the locomotive are also extended to provide access for the full length of each unit.[398]

For shop component pricing, CSXT accepts TPI's proposed pricing except for three areas discussed below. First, TPI developed its costs for the locomotive repair facility service fluid distribution equipment from a CSXT AFE that covered costs for a different component. The AFE cited by TPI as support for the service fluid distribution equipment is actually a cost for installing water treatment equipment that is used exclusively for the processing of engine coolant.[399] In order to meet the locomotive repair and service needs, locomotive shop repair "spots" require access to a variety of fluids including engine oil, compressor oil, journal oil, grease, water, coolant, and compressed air. To minimize the amount of hostling of locomotives within the repair facility, access to necessary locomotive fluids is required at each of the ten heavy repair spots and six 92 day inspection and service spots. CSXT has included the cost for the required service fluids distribution system.

Second, while CSXT accepts TPI's specification of two 30/10 ton gantry cranes in each shop, it found that TPI did not provide adequate support structures for the cranes to provide the

[397] *See* CSXT Reply WP "CSXT Cost Estimate Worksheets.pdf," part 2 for locomotive repair shop floor plan.

[398] *See* CSXT Reply WP "CSXT Cost Estimate Worksheets.pdf," part 2 for locomotive repair shop floor plan and photos.

[399] *See* TPI Op. WP "CEA 2010-207 Loco Water Treatment Machines - Avon.doc."

necessary coverage. Specifically, the spans identified in TPI's locomotive shop plan indicate that TPI provides for a span of only 55 feet,[400] which is only sufficient to access and serve the drop table/wheel truing/accident repair track. In major locomotive repair facilities, cranes are used to move heavy parts and components from the congested areas of the repair tracks and integral work platforms to the sides of the work area where they can be accessed by forklift or loaded onto trucks. To accomplish this, the crane coverage area must span all three locomotive repair tracks and work areas adjacent to those tracks, or a total width of 115 feet. CSXT's Reply Evidence corrects TPI's understatement and provides full crane coverage over all heavy repair spots and adjacent work areas.[401] CSXT's Engineering Experts accept TPI's proposed 55 foot span width for the 30/10-ton crane specified for the service and inspection tracks.

Third, TPI omitted from its locomotive repair facility the costs for rail car movers, which in the case of locomotive shops are actually used to move locomotives. Rail car movers are required to accomplish spotting of locomotives that cannot move under their own power and to permit the locomotive to be shut down to reduce noise and emissions in the shop. CSXT adds the cost for rail car movers to the TPIRR's major locomotive repair facility as set forth in its workpapers.[402]

[400] *See* TPI Op. WP "30-10 Ton Crane Quote.pdf."

[401] *See* CSXT Reply WP "CSXT Cost Estimate Worksheets.pdf," part 2 (locomotive repair shop floor plan).

[402] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tab "Loco Shop."

As described above, CSXT's Engineering Experts have corrected a number of major flaws in TPI's proposed locomotive major repair facilities costs. These corrections have increased the cost per facility from TPI's estimate of $20.3 million to $37.8 million.[403]

d. Diesel Service and Inspection Shop (S&I)

In addition to its major locomotive repair facilities, the TPIRR also would require a number of diesel locomotive service and inspection facilities to conduct 92-day inspections and perform minor running repairs at TPIRR locations that do not have major locomotive repair facilities. Overall, the TPIRR will require diesel service and inspection shops at twelve major yard locations that are not equipped with locomotive heavy repair shops or fixed fueling facilities fitted to be capable of managing 92-day inspections and associated repairs/maintenance.[404]

Diesel service and inspection shops provide distinct mid-level functions different from those conducted at fueling facilities and locomotive shop described above. They focus on scheduled and warranty maintenance, minor component swap-outs, road readiness, all low level visual inspections as described in fueling facilities above, and required minor repairs that can be turned around within 24 hours. TPI's operating plan does not warrant having heavy repair shops at more locations than are proposed. However, while these heavy repair shops do have service and inspection tracks, they are spaced too far apart to provide adequate access for locomotive service and inspection. It would not be operationally practicable to provide service and inspection on tracks that are scheduled for heavy maintenance activities, because more complicated maintenance operations require more time and, as a result, locomotives tend to

[403] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "TPIRR yards" and "Loco Shop." *See also* CSXT Reply WP "CSXT Cost Estimate Worksheets.pdf," under part two for details.

[404] These locations are Atlanta, GA; Birmingham, AL; Chicago, IL; Cincinnati, OH; Cumberland, MD; Hamlet, NC; Indianapolis, IN; Louisville, KY; Nashville, TN; Selkirk, NY; Waycross, GA and Willard, OH.

dwell in the shop for protracted periods of time. Conversely, performing mid-level services is not practical at fixed fueling facilities where only truly minor repairs can be accomplished within the short time frame required for efficient fueling operations. The alternative of performing the repairs at fuel racks would needlessly hinder time sensitive fueling operations for other road locomotives. Diesel service and inspection shops (or Diesel "S&Is") provide the equipment and infrastructure required to effectively maintain locomotives in facilities that are not as robust and expensive to construct as heavy maintenance shops.

CSXT has included diesel service and inspection shops at the other twelve major yards without locomotive shops at a cost of $12.5 million per facility.[405]

e. Car Repair Shop

CSXT accepts TPI's assumption that the TPIRR freight cars would be acquired under full service lease arrangements and that no separate investment would be required for freight car repair facilities. CSXT has accounted for the tracks required to access each repair facility and the required acreage.[406]

f. Crew Change Facilities

TPI included costs for a total of 48 crew change locations on the TPIRR. TPIRR's crew change buildings at locations with an average of twenty or more crew starts per day are sized 35 feet by 64 feet for a total of 2,240 square feet per building. The TPIRR buildings at locations averaging less than twenty crew starts per day are sized 25 feet by 56 feet for a total of 1,400 square feet per building. Generally, each building is assumed to include basic facilities such as locker rooms, a break area, a work room, and other necessities. The costs for the crew change

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[405] *See* CSXT Reply WPs "TPIRR Facilities CSXT Reply.xlsx," Tab "TPIRR" and "CSXT Cost Estimate Worksheets.pdf," part three.

[406] *See* CSXT Reply WP "TPIRR Yard Matrix CSXT Reply.xlsx," Tab "Additional Tracks."

facilities are based on the R.S. Means cost per square foot for a building of this type with costs for additional items not included in the square-foot costs, such as HVAC, lockers, and furnishings added separately. CSXT accepts TPI's sizing and cost (summarized above) for large and small crew change facilities.

g. Yard Offices

TPI provided a total of 12 large and 50 small yard offices on the TPIRR. Yard offices are included at locations where there are car inspectors, transportation department field personnel, and more than one yard crew. The large yard office buildings are 35' by 64' while the small buildings are 25' by 56'. TPI's unit costs for these buildings are based on pricing developed for the large and small crew change facilities. CSXT's Engineering Experts have accepted TPI's large and small yard office costs and modified the counts of each to be consistent with the modifications CSXT made to the TPIRR operating plan on Reply.[407]

h. Maintenance of Way Buildings (Roadway Buildings)

TPI has included a total of 51 maintenance-of-way ("MOW") buildings on the TPIRR. Each building is similar in design to the crew-change facilities, but the interior is smaller because fewer employees use the space. Additional area is provided for garaging certain vehicles, as necessary, and storing MOW supplies. TPI's engineers developed the space requirements based on the number of workers in a typical MOW crew in each location as well as the need to house signal maintainers. The unit costs and specifications were derived from the cost for a small crew-change facility with additional costs added for site construction since not all MOW buildings are located at yards. CSXT accepts the cost of TPI's MOW building and its

[407] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tab "TPIRR Yards" for additional locations. *See also* CSXT Reply WPs "Automotive Worksheets.pdf," "Bulk Transfer Worksheets.pdf," and "Intermodal Worksheets.pdf" for evidence of where these yard offices can be found on CSXT sites.

methodology of correlating that building's cost with that of a small crew change facility. CSXT's Engineering Experts adjust the total number of maintenance-of-way facilities required for the TPIRR from 51 to 72 based on the necessary maintenance-of-way districts and personnel requirements, developed by CSXT on Reply.[408]

i. Guard Booths

TPI included one guard booth at each intermodal and automotive facility. It developed its costs for the guard booths from a quote from a manufacturer plus additional costs for items such as HVAC, concrete pad, and furnishings. CSXT's Engineering Experts accept TPI's costs and inclusion of guard booths for security at intermodal and automotive terminals.

As is apparent from TPIRR's facilities spreadsheet, TPI failed to include other fundamental elements such as the yard house for both intermodal and automotive terminals, as well as the other elements exclusive to intermodal terminals as described in other categories within this section (*i.e.*, in- and out-gates, maintenance pads, hostler fueling area, air compressor building and yard air systems, hostler office and welfare building and vehicle service and repair building). CSXT's Engineering Experts developed reasonable costs for these necessary components, and included them in the relevant building and facilities costs.[409]

j. Yardmaster Towers

TPI includes one yardmaster tower at each of the eleven (11) hump yards on the TPIRR. TPI developed costs for the yardmaster towers from documents provided by CSXT in discovery depicting costs for a yardmaster tower constructed in 1966 and indexed those costs to 3Q10 levels. CSXT's Engineering Experts accept TPI's use of the costs for a 1966 yardmaster tower

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[408] *See supra* III-D-4.

[409] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tab "TPIRR Yards" for costs. *See* CSXT Reply WPs "Automotive Worksheets.pdf," "Bulk Transfer Worksheets.pdf," and "Intermodal Worksheets.pdf" for evidence of where these facilities can be found on CSXT sites.

indexed to 3Q10 levels for the base tower and add components necessary to comply with today's accessibility standards under the Americans with Disabilities Act ("ADA"). As required by Section 203.9 (and section 1101.2.3 of the International Building Code) of 2010 ADA standards, "Spaces and elements within employee work areas shall … be designed and constructed so that individuals with disabilities can approach, enter, and exit the employee work area." Under the ADA, employees with disabilities are entitled to reasonable accommodations in the workplace so new buildings should be designed and built to comply with these provisions and avoid costly retrofits or lawsuits when current or new employees are or become disabled. Therefore, CSXT added the cost of a hydraulic 2,000 lb capacity elevator with three stops to bring the tower into compliance with governing accessibility standards. CSXT's Engineering Experts also adjusted the number of yard towers consistent with CSXT's operating plan.[410]

k. Wastewater Treatment

TPI assumed that the TPIRR building facilities are located near existing towns and cities and could be served by a local sewer connection or similar service. TPI, therefore, included costs for sewer tie-ins in the site costs for each facility. In addition, to handle runoff from various work by-products (*e.g.*, oil) before reaching the public sewer system, TPI included oil/water separators at a number of TPIRR yards. CSXT's Engineering Experts accept TPI's assumption that the TPIRR would be able to tie into local sewer systems. CSXT's Engineering Experts have added oil water separators at additional TPIRR facilities where oil water separators are required.[411]

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[410] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "TPIRR" and "Yard Master Towers" and CSXT Reply WP "Yard Master Tower Worksheet.pdf" and "CSXT Cost Estimate Worksheets.pdf," part four.

[411] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "Maintenance Pad" and "Vehicle Service Bldg."

l. Turntables

TPI included a total of 11 turntables at certain major TPIRR yards. CSXT's Engineering Experts have accepted TPIRR's turntable locations and unit costs and have added a turntable to the Queensgate, Cincinnati major yard to be consistent with the CSXT reply operating plan.[412]

m. In Gates and Out Gates

TPI failed to include the cost of In Gates and Out Gates, which provide secure management of the movement of containers to and from intermodal yards. TPI's intermodal yard provides no element to monitor the identification and control of valuable container inventory. Intermodal rail service providers must be able to closely manage the logistics of intermodal traffic, and advise their customers of the location of their merchandise at any given time. Such monitoring and control requirements make gate checkpoint facilities essential.

Necessary check point facilities vary with the size of the intermodal yard and volume of associated to/from-street traffic. The alternatives range from a small building or guard shack for small low volume yards, to large arrays of cameras and canopies where containers are processed, in most instances automatically, via cameras and automatic gate systems ("AGS") which document and scan containers moving in to and out from the yard.

In Gates and Out Gates are standard features of intermodal yard operations as evidenced through images from Google Map/Earth provided in CSXT's reply workpapers. It would be reasonable to assume that every TPIRR intermodal yard would have such standard features. To be conservative, however, CSXT's Engineering Experts have included costs for in gates and out gates only at those CSXT intermodal terminals where available aerial photographs have

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[412] *See* CSXT Reply WPs "TPIRR Facilities CSXT Reply.xlsx," Tab "TPIRR" and "Turntables Worksheet.pdf."

sufficient detail and clarify to confirm the presence of those facilities at CSXT yard and terminals replaced by the TPIRR.[413]

n. Maintenance Pad

TPI failed to include the cost of maintenance pads, which are commonly used by intermodal terminals in order to provide service and repairs to lift equipment (rubber-tired gantry cranes or "RTGs," side loaders, etc.). All lift equipment requires routine scheduled maintenance and unscheduled repairs.

Depending on their size, some intermodal terminals have several maintenance yards, including service and repair buildings (*see infra* III-F-7-r). Such maintenance yards and pads usually have shacks or containers that are used for material and tool storage in support of the maintenance pads in low-volume operations. Additionally, maintenance pads require electrical service, lift capability (forklifts and man lifts), lighting, and small water treatment facilities.[414]

In the experience of CSXT's Engineering Experts, maintenance pads are essential to intermodal yard operations and should be at every intermodal yard. However, CSXT's Engineering Experts have included costs for maintenance pads only at those CSXT intermodal terminals where available aerial photographs have sufficient detail and clarity to confirm the presence of those maintenance pads at CSXT yards and terminals replaced by the TPIRR.[415]

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[413] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "TPIRR" and "In Gate" and "Out Gate." *See also* CSXT Reply WPs "CSXT Cost Estimate Worksheets.pdf," part five and "Intermodal Worksheets.pdf."

[414] *See* CSXT Reply WPs "TPIRR Facilities CSXT Reply.xlsx," Tab "Maintenance Pad" and "CSXT Cost Estimate Worksheets.pdf," part five.

[415] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "TPIRR" and "Maintenance Pad" and "Intermodal Worksheets.pdf."

o. Hostler Fueling Area

TPI failed to include the cost of fueling facilities for the hostlers (*i.e.,* tractors) used to reposition trailers and containers in intermodal facilities. Such facilities are essential to provide off-road fueling for intermodal hostlers, which save costs for otherwise unnecessary expenditures for vehicle registration and insurance for vehicles that are not typically street legal. Except for those limited circumstances where remote storage yards require street-legal hostlers, hostler operations, fueling and servicing generally are all performed on-site. CSXT's Engineering Experts have included costs for hostler fueling only where available aerial photographs have sufficient detail and clarity to confirm the presence of those facilities at CSXT yards and terminals replaced by the TPIRR.[416]

p. Air Compressor Building and Yard Air Systems

TPI failed to include the costs for facilities required to house yard air compressor systems and to distribute the compressed air to departure and other tracks throughout the yard. Before a train departs, the railroad must perform a terminal airbrake test. Air compressor systems on locomotives are sized to maintain operability of the brake system during linehaul movements, but do not have the capacity to efficiently charge a depleted system. Access to yard compressed air is typically provided to at least one end of every segment of train consists to assist in charging the train brake systems and avoid unnecessarily extended dwell times at major yards. This typically is accomplished through a centrally located facility consisting of compressors, driers, filters, and receivers connected to a distribution network. Receivers (or large air tanks) are provided to mitigate the need for the compressors to run continuously, and to assure there is

[416] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "TPIRR" and "Hostler Fueling Area." *See also* CSXT Reply WPs "CSXT Cost Estimate Worksheets.pdf", part seven and "Intermodal Worksheets.pdf."

enough air reserved and available for peak demand conditions. The distribution network typically consists of underground piping from the compressor facility to trackside handholes fitted with a length of air hose and a gladhand.[417] System isolation valves are provided at strategic points to provide local maintenance without interfering with the entire system.

Air compressor building and yard air systems are essential to railroad classification yard and intermodal terminal operations, as illustrated by real-world images from Google Map/Earth. CSXT's Engineering Experts have included costs for yard air compressor buildings and associated distribution systems only where available aerial photographs have sufficient detail and clarity to confirm the presence of those facilities at CSXT yards and terminals replaced by the TPIRR.[418]

q. Hostler Office and Welfare Building

TPI failed to account for the cost of facilities to accommodate hostlers (*i.e.*, personnel operating hostler equipment) within intermodal terminals. Like train crews and yard switching crews, hostler operators report on and off-duty at intermodal facilities and require similar accommodations. Because the hostlers are in many instances affiliated with a third party provider, they will have separate business functions from those of railroad employees and would require separate facilities.

Third party operators do not comingle with railroad employees. Their organizations typically have separate locker requirements, time clocks, welfare amenities (break rooms, vending, restrooms, human resources requirements including record keeping, payroll, safety

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[417] A gladhand coupler is the identical interlocking connector attached to the air hoses that supply air from the locomotive or yard air systems to the brakes of the railroad cars.

[418] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "TPIRR" and "Air Compressor Bldg." *See also* CSXT Reply WPs "CSXT Cost Estimate Worksheets.pdf," part eight, and "Intermodal Worksheets.pdf."

training, computer/communication systems, etc.). For the purposes of accountability, third party operators and railroad personnel are kept separate. CSXT has accepted TPI's general crew change facilities as a reasonable model for this facility type and includes hostler accommodations only at those CSXT intermodal terminals where this facility can be located and documented.[419]

r. Vehicle Service and Repair Building

TPI failed to account for the cost of vehicle service and repair facilities at TPIRR yards and intermodal terminals. The repair and service of motor vehicles, including the tractors used to shuttle intermodal trailers and containers, must occur at regular intervals. Because the majority of the intermodal operations employ non-street-legal hostler tractors, these services must be provided on site for efficiency and convenience.

These types of buildings are usually found on intermodal sites servicing mostly hostlers. However, documented aerial photos show these buildings often have additional functions such as third party operator vehicle repair (typically yard bound pickup trucks) as well as containers, trailers, and chassis. At these service buildings, facilities are required for fueling, tire repair/change, oil changes, brake services and all of the normal service and repair functions associated with motor vehicle operations.

To design and equip a vehicle service and repair facility, CSXT's Engineering Experts have used as a model a two service bay building from a real world intermodal yard (even though many of the terminals on the CSXT system have buildings capable of accommodating more than two service bays). Each vehicle service and repair facility also requires a water treatment facility. CSXT's Engineering Experts have included vehicle maintenance and repair facilities

[419] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "TPIRR Yards" and "Hostler Welfare Bldg." *See also* CSXT Reply WP "Intermodal Worksheets.pdf."

only where available aerial photographs have sufficient detail and clarity to confirm the presence of those facilities at CSXT yards and terminals replaced by the TPIRR.[420]

s. Other Facilities / Site Costs

TPI included costs for lighting, paving, drainage and fencing at intermodal, automotive, and bulk transfer facilities as well as other TPIRR yards under the category of "other facilities and site costs." This category represents by far the largest cost element within TPI's facilities category. Not surprisingly, it also represents the largest difference between the parties with respect to building and facilities costs. CSXT notes that TPI has done a better job than past SAC case complainants of identifying relevant items and cost elements that the SARR would be required to incur for other facilities and site costs. But for many of the components, TPI applied inadequate or substandard design criteria that would render the assets unworkable under normal Class I railroad usage. Because of the magnitude of the investment in this category, CSXT addresses each of the major components—lighting, paving, drainage and fencing—individually. Table III-F-27 breaks out TPI's proffered investment costs for each category and compares TPI's investment to those developed on Reply by CSXT's Engineering Experts.

Table III-F-28
Comparison of Other Facilities and Site Costs

Component	TPI Open	CSXT Reply	Difference
Yard Lighting	$209.1	$240.0	$30.9
Yard Paving	$490.2	$609.0	$118.8
Yard Drainage	$77.8	$100.1	$22.3
Yard Fence	$17.9	$21.0	$3.1
Total	$795.0	$970.1	$175.1

[420] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tab "Vehicle Service Bldg." *See also* CSXT Reply WPs "CSXT Cost Estimate Worksheets.pdf," part nine, and "Intermodal Worksheets.pdf."

i. Yard Lighting

TPI developed yard lighting plans for the intermodal, automotive, and bulk transfer facilities as well as TPIRR yards based on existing CSXT lighting coverage shown on plans provided by CSXT in discovery and from Google Earth aerial views. *See* TPI Opening III-F-57. Those plans specify lighting types, wattage, tower heights, spacing, configuration, coverage areas, conduit lengths, and duct banks. TPI developed ratios of average lighting inventories to total yard areas using a single CSXT yard for each TPIRR yard type, and then applied these ratios to TPIRR yards. TPI bases its lighting unit costs on quotes from suppliers and R.S. Means data.[421]

CSXT accepts TPI's general approach of extrapolating lighting requirements for the TPIRR yards from existing CSXT facilities, but rejects TPI's use of one single yard as the basis for extrapolating costs for certain types of yards. This problem occurs for TPIRR's type 2 (larger non-specialty yards), automotive yards and bulk transfer yards where TPI computed an incorrect and average based from a single sample. CSXT corrects this error by adding lighting counts from an additional yard in each of the above referenced categories in order to obtain a more representative average for TPI's extrapolation approach.[422]

In addition, TPI's lighting cost submission failed to provide for necessary underground electrical conduit and pullboxes for its 20' wood light pole category.[423] Underground electrical conduits are needed to bring electricity from its source to service points. Electrical pull boxes are used to limit bends in excess of 360 degrees per conduit run and are required at junctions

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[421] *See* TPI Opening III-F-61.

[422] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tab "Yard Lighting Costs." *See also* CSXT Reply WP "Lighting Worksheet.pdf."

[423] Significantly, TPI did include these costs for the other types of lighting poles it specifies. *See* TPI Op. WP "TPIRR Facilities.xlsx" Tab "Yard Unit Costs References."

between vertical and horizontal conduit runs. TPI included these costs for its high mast lighting and 40' light poles but inexplicably not for its 20' light pole. CSXT corrects this omission.[424]

ii. Yard Paving

TPI developed paving plans for the intermodal, automotive, and bulk transfer facilities as well as TPIRR major yards based on a limited number of observations of paving conditions at existing CSXT yards. TPI reviewed CSXT yard plans provided in discovery and examined the locations in Google Earth to estimate the existing paving quantities, which it then extrapolated to the TPIRR yards. TPI also included paved inspection roads between the tracks in the TPIRR's inspection yards. TPI developed its paving costs based on R.S. Means unit costs for the pavement section it specified.

CSXT accepts TPI's approach of developing yard paving requirements based on aerial views of existing CSXT facilities as a reasonable starting point. TPI's pavement costs, however, are based on substandard specifications that would not withstand the burdens of every day railroad use. TPI provided only two generic asphalt and concrete pavement types for all of TPIRR's yards, without consideration of load and usage requirements. TPI assumed lighter asphalt types would be sufficient for all asphalt yard areas, including parking lots, roadways, DTL track-side fueling areas, intermodal trailer parking, and bulk transfer areas, regardless of vastly different loadings supported by these different areas. Similarly, TPI made a blanket assumption that the TPIRR could use lighter concrete for all concrete yard areas such as yard gate areas, intermodal concrete crane pad and intermodal concrete gate areas. Again, this assumption evinces disregard for very substantial variations in loadings. TPI provided no design information or calculations to justify the thickness of pavement sections it applied. Instead, TPI

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[424] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tab "Yard Lighting Costs" and "Yard Unit costs References."

simply estimated paving quantities from aerial photos and diagrams. Such a limited approach might in some circumstances provide reasonable estimates of surface areas, but does not yield information regarding the varying depths, types, and quantities of asphalt and paving required for the various different uses at rail and intermodal yards. Yard pavement sections should be designed based upon the applicable traffic index ("TI") which evaluates the relevant wheel loading and frequency of traffic to determine the ultimate load. A typical real world engineering worksheet for calculating pavement section requirements is attached for illustrative reference.[425] For intermodal facilities alone, CSXT uses five different paving standards, three for concrete and two for asphalt pavement sections, including standards for:

- Concrete crane runways;
- Concrete working track areas along side strip tracks where containers are handled by cranes;
- Other concrete areas such as gate entry areas;
- Asphalt roadways along strip tracks and container parking areas; and
- "Light" traffic areas requiring asphalt but minimal improved driving surface.

CSXT specifically objects to the pavement sections proposed by TPI for the intermodal facilities. TPIRR's proposed concrete section is not realistic and ignores costs for over-excavation, backfilling, compaction, and base aggregate. Container lift equipment (RTGs and side loaders) in intermodal yards impart extremely heavy loads on pavement sections.[426] CSXT developed corrected costs using R.S. Means and taking into account the proper concrete cross section based on industry standards, and CSXT's Engineering Experts' experience.[427]

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[425] *See* CSXT Reply WP "Pavement Section and Cost Worksheets.pdf."

[426] *See* CSXT Reply WPs "TPIRR Facilities CSXT Reply.xlsx," Tab "Yard Unit Cost References" and "Pavement Section and Cost Worksheets.pdf."

[427] *Id.*

TPI also did not include appropriate costs for yard concrete pavement typically used at intermodal facilities. Crane (RTG) runways must have deeper cross sections than those of surrounding pavement because they are subject to heavier loads. RTGs run in a narrow path parallel to intermodal strip tracks. Their tires impart heavy loads which must be borne on correspondingly heavy (thick) pavement sections. Crane runway pads are typically ten feet wide at either side of the crane span. Depending on soil conditions, concrete pavement (Portland Cement Concrete) typically is not less than 16" thick and the total pavement section including the base material will be more than of 30" thick.[428]

In addition, intermodal and bulk transfer terminals should have asphalt pavement cross sections and costs that are different from and stronger than those of typical parking lot asphalt. Intermodal and bulk transfer terminals are subject to forces exerted by heavy containers and machinery operations that are more demanding than the standard parking lot asphalt cross section proposed by TPI.

CSXT accepts TPI's asphalt cross section for regular traffic (*i.e.*, cars and light trucks) in areas not subject to heavy loads, but has added costs for over excavation, backfilling, and compacting required for this construction. This effort is related to roadway construction and is separate and apart from that required for track work.[429]

For all yard paving designs and costs, CSXT provided pavement design sections from recently constructed intermodal terminals and cost information from 2012 R.S. Means taking into account the proper array of asphalt and concrete cross sections found in various functional

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[428] *See* CSXT Reply WPs "TPIRR Facilities CSXT Reply.xlsx." Tabs "Yard Pavements and Fence Costs" and "Yard Unit costs References." *See also* CSXT Reply WP "Pavement Section and Cost Worksheets.pdf."

[429] *See* CSXT Reply WPs "TPIRR Facilities CSXT Reply.xlsx," Tab "Yard Unit costs References." *See also* CSXT Reply WP "Pavement Section and Cost Worksheets.pdf."

yard areas. CSXT's Operations Experts have also identified three additional intermodal terminals that were missing from TPI's opening evidence. The pavement and facilities costs associated with those three additional yards (at Marion, OH; Louisville, KY; and North Baltimore, OH) have been incorporated in CSXT's corrected workpapers.[430]

CSXT accepts the paving areas proffered by TPI for Automotive terminals and Bulk Transfer terminals. CSXT also accepts TPI's extrapolation approach for deriving pavement take-offs for TPI's type 2 yards (larger non-specialty yards) but rejects the pavement numbers used to quantify type 1 yards (smaller non-specialty yards) pavement averages. For numerous type 1 yard locations, TPI incorrectly identified the pavement compositions forming the basis for its ratio method. To correct these errors, CSXT located and identified actual compositions within type 1 yard locations used in TPI's ratio method (as well as actual intermodal terminal pavement as evidenced through aerial photos) and applied those corrected pavement compositions to develop more reasonable and accurate pavement areas for TPIRR type 1 yards.[431]

iii. Yard Drainage

TPI provided for drainage facilities at TPIRR major and other yards as well as the automotive, intermodal, and bulk transfer facilities based on plans provided by CSXT in discovery. TPI's yard drainage facilities consist of catch basins, drainage pipes, and headwalls. TPI determined quantities of those elements based on drainage systems layouts for yards

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[430] *See* CSXT Reply WP "TPIRR Facilities Response.xlsx," Tabs "TPIRR Yards" and "Yard Pavement and Fence Costs." *See also* CSXT Reply WP "Intermodal Worksheet.pdf" for documentation.

[431] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "Yard Pavement and Fence Costs" and "Yard Unit Costs References." *See also* CSXT Reply WPs "Intermodal Worksheets.pdf," "Other Yards Worksheets.pdf," and "Pavement Section and Cost Worksheets.pdf" for details.

provided in discovery and Google Earth aerial images. CSXT accepts these unit costs and has applied them to the adjusted quantities discussed below to calculate total drainage costs. However, TPI assumed TPIRR flat yards with less than 10 tracks would require no drainage, claiming they would be "be sufficiently graded to allow for the water to drain naturally." *See* TPI Opening III-F-62. CSXT rejects the omission of drainage at these yards and develops quantities using the same method as for flat yards with more than 10 tracks. As the Board recently explained in *SunBelt*, water build-up between tracks that must flow through the ballast would deteriorate the track.[432] CSXT develops yard drainage inventories for flat yards with less than ten tracks using the method TPI applied to all other flat yards.[433] TPI derived unit costs from R.S. Means. CSXT accepts these unit costs and applies them to the adjusted quantities.

iv. Fencing

CSXT accepts the actual fencing counts for the automotive and bulk transfer terminals but has provided actual fencing counts for intermodal terminals.[434] CSXT also accepts TPI's ratio method for fencing take-offs for TPI's type 2 (larger non-specialty) yards, but refutes the fencing counts used to quantify type 1 (smaller non-specialty) yards fencing count averages. For numerous type 1 yard locations, TPI missed the counts of fences in developing the basis for the .75 ratio method. CSXT corrected this error by locating and identifying actual length of fences

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[432] *See SunBelt*, STB Docket No. 42130, at 120. The Board rejected SunBelt's exclusion of yard drainage in part because "SunBelt's plan of employing water drainage through ballast is not the correct way to transfer runoff to ditches, as water deteriorates track and roadbed—water should be drained away from the tracks, not though them."

[433] CSXT uses the same assumption for the developed yard acres as TPI uses when developing paving and lighting quantities. *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tab "Yard Drainage Costs."

[434] *See* CSXT Reply WPs "Intermodal Worksheets.pdf" and "Other Yards Worksheets.pdf."

in the type 1 yard locations used in TPI's approach, and actual fence counts for the intermodal terminals, and used those inputs to correct TPIRR fencing quantities and costs.[435]

v. Pavement Marking

CSXT accepts TPI's pavement marking counts for TPIRR's yards and terminals.

t. Curtis Bay Coal Facility

TPI credited the TPIRR with revenue for coal traffic moving to Curtis Bay in Baltimore, Maryland. However, TPI's Opening Evidence failed to include the cost of constructing the Coal Trans-Shipment facility at Curtis Bay. To correct that omission, CSXT has developed costs for a Coal facility as described below.

Existing CSXT Curtis Bay Coal Facility

The existing CSXT Coal facility occupies the southern half of the Curtis Bay Yard and a general freight yard (partial hump yard) occupies the northern half of the yard. CSXT's corrected TPIRR configuration on Reply requires the TPIRR to construct and operate both the coal facility and the general freight/merchandise yard at Curtis Bay.[436] On Opening, TPI also replicated the CSXT automobile loading facility to the east of the Curtis Bay freight yard.

The existing CSXT Curtis Bay coal facility has three warming sheds and three bottom dump buildings for unloading inbound unit trains. A system of large overhead conveyors and towers (85'-110' in height) move and deposit the coal in piles for storage. When a bulk freighter (Panamax ships are typical with 65,000-80,000 ton capacity) arrives at the existing piers, facility

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[435] *See* CSXT Reply WP "TPIRR Facilities CSXT Reply.xlsx," Tabs "Yard Pavement and Fence Costs." *See also* CSXT Reply WPs "Intermodal Worksheets.pdf" and "Other Yards Worksheets.pdf."

[436] *See supra* III-B-3-a.

personnel use bulldozers to move coal from the storage piles into conveyor hoppers that then load the vessel.[437]

Coal Facility Trackwork

TPI has proposed that the TPIRR would process a maximum of 7.66 million tons of coal per year to through the facility, approximately 130,769 tons a week.[438] One coal unit train with 119 cars (110 tons capacity each) could ship 13,090 tons of coal.[439] To sustain TPI's specified production rate, the coal facility would be required to process 10 unit trains of coal[440] each week, or two unit trains per day.

Coal facilities such as the Curtis Bay facility typically maintain capacity to process much higher daily volumes of coal than their average daily output. Such capacity is necessitated by rush orders, delays, and mine production variations that create infrequent and irregular deliveries to coal shipping facilities (*i.e.,* facilities could receive two or three days of deliveries which had been delayed within one day). For this reason, CSXT's Engineering Experts designed the TPIRR coal facility with capacity to process twice its average daily output.

The existing 60" conveyors from the dumpers to the coal piles can carry 3,000 tons/hour. This means that one dumper building can unload one unit train in 4.36 hours, or two unit trains per day. In its Reply Evidence, CSXT provides for two dumper buildings and two inbound tracks for the Curtis Bay facility in order to accommodate up to four unit trains a day (*i.e.,* approximately twice the daily average coal volume output of the facility posited by TPI's

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[437] *See* CSXT Reply WP "Panamax_Capacity_12-8376_30-ship-sizes.pdf."

[438] 6,800,000 tons / 52 weeks = 130,769 tons/week. *See* TPI Op. WP "TPIRR_TRAFFIC_HISTORICAL_CARLOAD_2012.xlsx."

[439] 110 tons/per x 119 cars = 13,090 tons/train.

[440] 130,769 tons / 13,090 tons/unit train = 10 Unit Trains

Opening Evidence). There will also be four outbound tracks, which will allow for up to four departing trains to be inspected, with the removal of bad-order to the set-out tracks.

Tracks

CSXT's Engineering Experts have determined that the two inbound tracks, four outbound tracks, and one runaround track will each require a capacity of 119 coal cars (53'-1" per car) and three locomotives (85' per locomotive) for total length of 6,572' each (clearance point to clearance point).[441] The set-out track for bad-order coal cars would have a length of 785'.[442] CSXT also provides track for warming huts, dumpers, and loop curves to the outbound storage tracks.

CSXT's Engineer Experts assume Number 10 hand-throw turnouts will be used for the tracks and for the crossovers.

To reach the coal facility from the TPIRR mainline, seven tracks (two inbound, four outbound, and one runaround) will require structures built to cross Patapsco Avenue, each with a span of 70'. Two additional single track structures are required to traverse the conveyor network near the pier. Spans for the structures over the conveyor network would be 230' and 250' in length. These bridges replicate the existing bridges.

Conveyor System & Pier Costs

To unload coal from unit trains, CSXT included two warming huts located in front of the dumpers and two dumper buildings (bottom dump) in its coal facility design. From the dumper buildings, TPIRR would move coal to the 85'-110' towers via above ground conveyors and then

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[441] *See* CSXT Reply WPs "TPI_Curtis_Bay_Coal_Facility_Schematic.pdf" and "Curtis Bay Coal Pier.xls."

[442] *See* CSXT Reply WPs "TPI_Curtis_Bay_Coal_Facility_Schematic.pdf" and "Curtis Bay Coal Pier.xls."

pile it. From the piles, coal would be moved to below ground conveyor hoppers then moved to the pier and loaded into bulk carriers via crane.

CSXT's coal facility design has replicated the existing 900' by 57' pier at Curtis Bay and accounted for the cost of conveyor and crane equipment to load coal into vessels. The crane is a large gantry type which moves the length of the pier, via rails, dumping coal using conveyors.

Other Costs

Other costs for the coal facility include office buildings and a maintenance shop, along with lighting, electrical, water, and other utilities.[443] Also, CSXT has included aggregate for a necessary access road around the facility.[444]

CSXT assumed one foot of common excavation to construct the total area of track, ground storage, and yard facilities (following typical SARR yard earthwork methodology).[445]

Also, CSXT has included costs for a detention pond/treatment facility with asphalt lining in the Curtis Bay coal facility cost estimate.

Coal Facility Operation Costs

To operate the facility, CSXT's Reply has included 10 bull-dozers, for handling and moving material from the coal piles to the conveyor hoppers.

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443 *See* CSXT Reply WP "Curtis Bay Coal Pier.xls."

444 *See* CSXT Reply WP "Curtis Bay Coal Pier.xls."

445 *Id.*

8. Public Improvements[446]

a. Fences

CSXT does not take exception to TPI's observations that the vast majority of the CSXT right-of-way being replicated in this case is not fenced. However, fencing costs still must be included where fencing is necessary, not only for intermodal and automotive yards, but also at key signal facilities to provide security for integral signal-system components and equipment that is vital to railroad operations and safety. These costs are reflected in the corresponding sections. *See, e.g., supra* III-F-7-s-iv.

b. Signs

TPI included a standard package of railroad signs, including milepost, whistlepost, yard limit, cross buck and ENS signs and posts for a total cost of $16.8m. *See* TPI Opening III-F-63. While the majority of that sign package is sufficient, CSXT's Engineering Experts identified a deficiency in TPI's proffered milepost and whistlepost signing costs, due to insufficient installation costs. TPI's supporting documentation for milepost and whistlepost sign costs clearly reflects material and labor costs for Tennessee DOT highway signage at railroad crossings and not railroad signage.[447] While signage is similar in quality and design, the costs of access to railroad milepost and whistlepost locations (*i.e.* ingress and egress to the majority of the remote locations) is not adequately reflected in standard DOT highway cost allocations. CSXT's Engineering Experts have adjusted the installation costs, using AFE data provided in

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[446] This section is sponsored by Randall Frederick. Mr. Frederick is a Project Manager and Senior Engineer with STV Inc. and has over 30 years of experience managing underground wireline and pipeline utility installations and construction, engineering, and inspection ("CE&I") services for highway and railway bridges and tunnels. Mr. Frederick's qualifications are further set out in Section IV *infra*.

[447] *See* TPI Op. WP "Track Construction.xlsx," Tab "MP and Whistle Post;" *see also* MUTCD W10-1, as referenced in the FHWA's Manual on Uniform Traffic Control Devices – 2009 Edition).

discovery to account for the additional installation challenges presented by such railroad signs *See* CSXT-TPI-HC-089983. As a result, CSXT adjusted the cost to install all whistlepost and milepost signs on the TPIRR to $2.5 million, which reflects actual documented labor and material costs.

c. Highway Crossings and Road Crossing Devices

Grade Separations

Because all of TPIRR's referenced grade-separated crossings are highway overpasses, these costs are addressed elsewhere.

At-grade Crossings

The TPIRR would build all at-grade crossing surfaces and pay 100% of material costs.[448] CSXT's Engineering Experts reviewed the number of crossings identified along the TPIRR route (7,941). Closer evaluation of the TPI evidence in comparison to CSXT's crossing inventory (provided in discovery) revealed that TPI failed to account for 419 crossings.[449] Therefore, CSXT's Engineering Experts have included the additional 419 crossings in its reply evidence, bringing the total number of crossings to 8,360.[450] CSXT does not object to the TPIRR's rubber and asphalt / rail-seal crossing surface configuration and the average 24-foot crossing surface width.

CSXT's Engineering Experts do object to TPI's proposed grade crossing construction cost of $414.75 per track foot. Review of TPIRR's supporting Grade Crossing surface

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[448] *See* TPI Opening III-F-63.

[449] *See* CSXT Reply WP "TPI Crossings CSXT Reply.xlsx," Tab "Additions to Opening Inventory."

[450] *See* CSXT WP "TPI Crossings CSXT Reply.xlsx," Tab "Reply Xing Inventory"

specification and cost data shows costs ranging widely from $290 to $575 per track foot.[451] And several of those cost estimates lack sufficient material detail to determine compliance with Class I railroad crossing standards included in CSXT materials produced in discovery.[452] Applicable standards include 6" diameter perforated drainage pipe, 19 ½" tie spacing, clamps in the tie cribs (2 – 4 to hold rubber surface material in place), drainage requirements between roadway and sidewalks to eliminate water pockets, miscellaneous profile considerations to fit roadway approaches, and so forth. None of the foregoing specific items is accounted for in TPIRR's crossing construction costs estimates. Information CSXT provided in discovery clearly and comprehensively describes detailed at-grade crossing surface materials and labor costs for crossings meeting Class I standards at $792 per track foot (indexed to $751 for TPIRR construction year 2010).[453] CSXT applied those documented costs to adjust TPIRR grade-crossing construction costs.[454]

Finally, the TPIRR's crossing construction costs factored only a single track crossing in its totals, at each rail-highway intersection. A further review of the CSXT crossing inventory, compared to TPIRR's inventory, reveals numerous multiple track at-grade crossings. Taking into account multiple track crossings and single track crossings, CSXT's Engineering Experts' analyses determined that the average number of tracks per crossing is 1.4. Accordingly CSXT's Engineering Experts developed and applied additional crossing construction costs to account for multi-track rail-highway crossings.[455]

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[451] TPI Op. WP "2012 SCTRA Bid Sheets.pdf."

[452] *See* CSXT Reply WP "MWI 2521.pdf."

[453] CSXT Reply WP "CSXT Crossing Surface Cost.pdf."

[454] *See* CSXT Reply WP "Track Construction CSXT Reply.xlsx," Tab "Grade Crossing."

[455] *See* CSXT Reply WP CSXT WP "TPI Crossings CSXT Reply.xlsx," Tab "Reply Xing Inventory."

Based upon the foregoing, CSXT's Engineering Experts revised the Grade Crossing construction costs to reflect actual, documented, material and labor costs. These corrections increased the total TPIRR Grade Crossing costs to $210 million.[456]

9. Mobilization

CSXT accepts TPI's mobilization cost factor of 2.7 percent applied to all TPIRR road property investment accounts except land. CSXT includes in its land costs a $13,000 per parcel cost to account for the acquisitions costs the TPIRR would necessarily incur while acquiring the land needed for the ROW. *See supra* III-F-1-e.

10. Engineering

CSXT accepts TPI's engineering additive.

11. Contingencies

CSXT accepts TPI's contingency factor.

12. Construction Schedule

CSXT accepts the 30-month construction schedule proposed by TPI.

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[456] *See* CSXT Reply WP "Track Construction CSXT Reply," Tab "Summary.

Table of Contents

III. STAND-ALONE COST

G. DISCOUNTED CASH FLOW ANALYSIS

TPI's discounted cash flow ("DCF") model contains a number of invalid inputs and assumptions ranging from a flawed calculation of the future TPIRR cost of equity to overly aggressive assumptions regarding future inflation. Each of these issues is discussed below.

1. Cost of Capital

TPI followed the Board's approved and preferred approach in developing capital costs for the TPIRR by employing for the years 2008-2012 the values determined by the Board in its annual cost of capital proceedings. TPI used the railroad industry cost of capital to calculate the capital recovery charges for all road property investment. CSXT accepts TPI's use of the Board determined railroad industry cost of capital as the starting point for the TPIRR.

CSXT makes one correction to TPI's TPIRR cost of capital calculations by adding equity flotation costs for the TPIRR that were completely omitted by TPI. Equity flotation costs are the fees charged by investment bankers when a company raises external equity capital and they can amount to anywhere between one percent to upwards of seven percent of the total amount of equity capital raised, depending on the type and size of the offering.[1] Until 2007, the Board had rejected arguments by railroad defendants in SAC cases that the costs of raising the equity necessary to finance the construction of the SARR must be included in the SAC cost analysis. But the Board has come to recognize the economic validity of accounting for the very real costs that a stand-alone railroad entrant would be required to pay for an equity issuance.

Most recently, in *DuPont*, the Board acknowledged explicitly that whether capital is raised through one massive Initial Public Offering ("IPO"), or in smaller amounts over a longer

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[1] *See* CSXT Reply WP "III-G Cost of Raising Capital.pdf."

period of time, it would be unreasonable to assume that the SARR could raise capital through the issuance of stock without paying an appropriate equity flotation fee. *See DuPont*, STB Docket No. 42125, at 274.[2] The Board, however, rejected defendant NS's evidence of a recent IPO for Facebook as representative of the cost a large SARR would likely incur for equity flotation costs, reasoning that Facebook is not as capital intensive as a railroad and that there are different risks of investing in the information technology sector as opposed to railroads.

CSXT respectfully submits that neither of the reasons articulated by the Board for rejecting the Facebook transaction as an appropriate benchmark has merit.[3]

In general, equity flotation costs, also called gross spreads, are dependent on the size of the gross proceeds raised. Gross spreads are not reflective of either the risk profile of the specific company going public nor the industry characteristics, but rather are dependent on the size of the IPO gross proceeds raised. In the United States, IPO gross spreads traditionally start at seven percent of total proceeds raised and decline from that point. The gross spread serves as compensation to the underwriter/investment bank for the actual work done in underwriting that particular IPO. The gross spread compensates the investment bank for the work of the investment bankers in such areas as: drafting the prospectus, valuing the company, performing due diligence, creating, planning, and executing an investor road show presentation, selling the IPO to investors, pricing the IPO, and paying for underwriter's counsel.

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[2] The Board drew the same conclusion in its more recent decision in *SunBelt*. *See SunBelt*, STB Docket No. 42130, at 184.

[3] The ensuing discussion of equity flotation costs is sponsored by Mr. Daniel Klausner, Managing Director of FTI Consulting and a member of FTI Capital Advisors. Mr. Klausner has more than 20 years of investment banking and capital markets experience advising companies, private equity, and venture capital firms on capital raising, equity offering readiness, and investment banking project management.

Issuers and investment bankers negotiate gross spreads in advance of launching the IPO. This is necessary because the issuer needs to reflect the IPO transaction accurately in the prospectus (the expenses of the transaction need to be calculated in order to derive the net proceeds raised from the transaction) and finalize the structure of the IPO (*i.e.*, amount of proceeds to raise, total debt paydown). The gross spread is one of a handful of critical items that both parties know need to be finalized before a launch. The gross spread is typically not renegotiated at the pricing; the original gross spread percentage stands firm. At the pricing, the gross spread percentage is applied to the final price to derive both the per share gross spread and the total gross spread.

Gross spreads are set by bankers who look very closely at precedent IPOs. Investment bankers typically try to "hold the line" for gross spread percentages (*i.e.*, they try to keep them as high as possible) but since the investment banking business is very competitive, issuers do try to negotiate these gross spreads lower. Sometimes investment bankers are not able to successfully push back on an issuer in these negotiations and thus gross spread outliers may occur which are not easily explained other than the investment bankers were not effective negotiators.

In examining the empirical evidence relating to gross spreads for large IPOs in the U.S., the evidence demonstrates that gross spread is not dependent on industry or specific company characteristics but tends to follow the dollar amount of proceeds raised. Typically, the larger the dollar amount of IPO proceeds raised, the lower the gross spread percentage. A $100 million IPO will always have a higher gross spread percent than a $5 billion IPO. It is important to know that the data set for large deals (*i.e.*, IPOs more than $1 billion) is relatively small so one or two outlier IPOs can skew the averages. For instance, the General Motors IPO had a relatively low gross spread given the commercial need for all of the Investment Banks to be associated with the IPO of a high profile U.S. Government owned company.

Gross spread variations are not supposed to reflect risk, nor were they ever designed to. They primarily vary based on the dollar amount of IPO proceeds raised. This is demonstrated by examining any given specific industry while holding constant the gross proceeds raised. The gross spread does not vary according to risk, capital investment needed or even the growth profile of the company. If this was the case, companies such as Twitter or Facebook (characterized as being in the information technology industry), which many perceive as having a higher risk profile than say an industrial, or consumer discretionary company, would have paid a higher gross spread than those other companies in their IPOs. For example, Twitter in the information technology industry raised approximately $1.8 billion and paid a gross spread of 3.25%, which is significantly lower than Nielsen in the industrial sector, which raised approximately the same amount ($1.6 billion) and paid a gross spread of 4.50%. Variations across industries may also be explained by the fact that gross spreads for a specific company in a particular industry tend to cluster around their comparables because companies negotiate with their investment bankers according to what gross spread their "comps" paid. A CEO of a healthcare company compares his company (in terms of valuation, investment strategy and growth) to other healthcare companies first so the negotiations around gross spread typically start with industry comparables that are raising a similar dollar amount of IPO proceeds. So precedent transactions, and not risk, are extremely important in setting the gross spread for a particular company.

Additional evidence that refutes the notion that gross spreads reflect risk or capital intensity of a business is the existence of incentive fees. In cases where the issuer is able to negotiate the investment bankers down to a lower gross spread than their comps, the investment banker may try to increase the gross spread by proposing a separate incentive fee at pricing to get the effective negotiated fee back up to the level of the comps. The incentive fee would be added to the original gross spread as "incentive/reward" for the bankers pricing the IPO effectively and successfully. However, this incentive fee may not be awarded at pricing because of the perception by the issuer of poor or sloppy execution on the part of the investment banker. Given this incentive fee structure different deals in which comparable amounts are raised might show different gross spreads. None of this difference is impacted by the perceived riskiness of the particular IPO.

The risk of a particular IPO is in fact reflected in the price that investors pay for the stock at the pricing of the IPO. The price of an IPO, (*e.g.*, $15 per share) is determined by the multiple (Price/Earnings, EBITDA, EBIT) that both the investor and issuer "agree" on at pricing. Companies with a higher risk profile (such as those with lower credit ratings), companies which require a large amount of capital expenditures to get to profitability, or those that do not have a strong growth record may not receive a high price or multiple: so the IPO which was originally launched into the market at a midpoint price of $15 per share may actually price at $12 per share. The $12 per share price is a lower multiple than the $15 per share price and reflects the fact that investors do not want to pay as much as originally thought for the company. However, the negotiated gross spread is not reflective of any of these factors at all.

As the Board recognized in *DuPont*, the TPIRR's cost to raise equity is a cost that must be borne directly by it, just like other direct costs associated with construction of the TPIRR. The fee that must be paid to underwriters to raise the necessary financing is no different in kind from the fee that must be paid to engineers to design the TPIRR. It is a cost incurred by a new entrant to construct and operate a major railroad project, and it should be reflected in the SAC analysis. Because railroads have not recently incurred costs to raise new equity, there are no equity flotation costs included in the Board's 2008 through 2012 railroad cost of capital determinations.[4] The most recent significant raising of capital by a railroad occurred in 1991, and the ICC in its annual railroad cost of capital determination for that year acknowledged that the Burlington Northern Railroad had incurred equity flotation costs of about 3.9 percent in connection with the issuance of over 10 million shares of new common stock.[5] Although CSXT believes that the 3.9 percent cost to raise equity incurred by BNSF in 1991 is in the middle of the range that would be experienced by the TPIRR for raising its equity,[6] CSXT asked Mr. Klausner to research other recent capital raising efforts for indications of market level equity flotation costs.

Specifically, Mr. Klausner researched selected large US IPOs that have occurred over the last ten years and organized that data based on the size of the equity offering and on the industry sector of the firms raising the equity. Overall he identified a total of 32 IPOs with underwriting fees ranging from a low of .75% to a high of 5.12%. Table III-G-1 summarizes the results by relative size of transaction.

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[4] The Board's railroad industry cost of capital determinations do, as explained in the AAR cost of capital submissions to the Board, include debt flotation costs.

[5] *Railroad Cost of Capital – 1991*, 8 I.C.C.2d 402, 414-15 (1992).

[6] *See* CSXT Reply WPs "III-G Cost of Raising Capital.pdf" and "III-G Stock Market Liquidity and the Cost of Raising Capital.pdf."

Table III-G-1
Summary of US IPOs Over Last 10 Years

Equity Range	Number of Transactions	Average Equity Raised ($ m)	Average Underwriting Fee (%)
$1B to $1.99B	20	$1,388	4.1%
$2B to $4.99B	10	$2,871	3.3%
$5B to $9.99B	0	-	0.0%
$10B+	3	$16,548	1.5%
Total	**33**	**$3,273**	**3.6%**

Table III-G-1 shows that the average of all underwriting fees for large US IPOs during the last 10 years is 3.6%. It also shows a pattern of fees declining with increases in the size of the transaction. To address the concern by the Board raised in *DuPont* relating to the potential for different risks being associated with different industries, Table III-G-2 summarizes the IPOs by industry sector. Consistent with the explanation sponsored by witness Klausner that risk does not affect flotation costs (*see supra* at III-G-3 through III-G-4), the average fees for these transactions relate to the average amount of equity raised and not to any perceived "risk profile" for the companies involved.

Table III-G-2
Summary of Selected US IPOs By Sector

Sector	Number of Transactions	Average Equity Raised	Average Underwriting Fee
All	32	$ 3,273	3.6%
Consumer Discretionary	3	$ 6,378	2.9%
Energy	4	$ 2,089	3.7%
Financials	9	$ 2,111	3.4%
Healthcare	3	$ 2,442	3.9%
Industrials	3	$ 1,650	4.5%
Information Technology	7	$ 6,027	3.3%
Materials	1	$ 1,385	4.5%
Telecommunication Services	1	$ 1,150	4.7%
Utilities	1	$ 1,247	3.0%

Table III-G-2 shows that average underwriting fees by industry sector fall within a relatively narrow range of 2.9% to 4.7%.

For a transaction as large as that required for the TPIRR, a gross spread range of 2.0% appears to be reasonable and in fact conservative. There are only three IPOs in the data set in which the gross proceeds were more than $10 billion, and two involved special circumstances that enticed the investment bankers to negotiate lower gross spreads. In the General Motors transaction, the U.S. Government was selling its own shares in the IPO and the investment banks were eager to be a part of the transaction. Similarly, for Facebook there was significant interest and even excitement expressed about the IPO and investment banks were competing to be a part of the transaction.

Based on TPI's Opening DCF, the TPIRR would need to raise approximately $21.8 billion in equity.[7] And based on CSXT's Reply Evidence, the correct figure increases to $30.1 billion in equity. An equity offering of this size is very rare—only three transactions in the last ten years exceeded $10 billion. But to be conservative and to avoid the claim that a higher figure would be a barrier to entry, CSXT includes equity flotation costs for the TPIRR of 2%—or $602 million based on the offering size indicated by CSXT's evidence, or $436 million using the figure in TPI's evidence.

2. Inflation Indices

TPI used actual AAR cost indices and Global Insight's December 2013 RCAF forecasts to calculate annual inflation forecasts.[8] CSXT does not dispute TPI's road property asset and operating expense DCF inflation indices derived from these sources and, consistent with Board

[7] This figure is derived from the approximately $29.4 billion in TPIRR construction costs estimated by TPI and an average equity weighted capital structure of 74%.

[8] TPI Opening III-G-5.

precedent, updates those indices in circumstances where new actual index and forecast values have become available.

CSXT Reply inflation index forecasts for the TPIRR are based on Global Insight's March 2014 forecasts.[9] As discussed in Section III-D-1-c-i, due to the passage of time from the filing of TPI's initial complaint to the submission of its opening SAC evidence, the prices CSXT actually paid for fuel from 2010 to 2013 are known. The Board has long expressed a preference for actual data over indexed or forecast data[10] so, instead of applying the Board's Hybrid RCAF index to TPIRR 2010 fuel costs, CSXT developed fuel costs for the TPIRR using its available actual average quarterly fuel price data from the third quarter 2010 through the fourth quarter of 2013. To remain consistent with the standard SAC practice of developing operating expenses as of the SARR start date and adjusting those values for changes in prices and changes in volumes in the DCF, CSXT calculated TPIRR fuel expenses as of third quarter 2010 using CSXT actual cost of fuel for that period as part of the TPIRR operating expenses that are input to the DCF. CSXT modified the DCF to calculate TPIRR fuel costs for the fourth quarter of 2010 through the fourth quarter of 2013 by applying CSXT's actual quarterly average fuel price to TPIRR third quarter 2010 service units as adjusted for changes in TPIRR traffic levels based on changes in TPIRR gross ton miles. CSXT also modified the Board's Hybrid RCAF index by substituting the All Inclusive Index – Less Fuel (AII-LF) for the RCAF index in the DCF Hybrid index for 2010 through 2013 and applied that index to only the TPIRR non-fuel expenses. CSXT returned to application of the Board's standard Hybrid RCAF to all TPIRR operating expenses after 2013.

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[9] *See* CSXT Reply WP "rcaf20141Q.pdf."

[10] *See, e.g., Duke/NS,* 7 S.T.B. at 143 ("Because actual data are clearly superior to any forecast or projection, they are used here."); *see also Duke/CSXT,* 7 S.T.B. at 446; *WP&L*, 5 S.T.B. at 991.

TPI assumes land values will rise an average of 4.4 percent annually from the third quarter of 2010 through the end of the 10-year TPIRR DCF period. CSXT accepts TPI's land inflation index.

3. Tax Liability

TPI's DCF incorporates three errors affecting the calculation of TPIRR income tax liability. First, as discussed in Section III-H-1-f, TPI misapplied the guidelines relative to bonus depreciation by assuming this temporary measure would apply to TPIRR assets at the time of their replacements. Second, as also as discussed in Section III-H-1-f, TPI used the wrong tax life for certain of the TPIRR road property assets. Third, as discussed in Section III-H-5, TPI improperly changed the longstanding and critical assumption in the DCF model that because the TPIRR cost of debt is locked in at the debt rate in place during the TPIRR construction period, the TPIRR debt is amortized over an assumed 20-year financing term. CSXT corrected these shortcomings as explained in the referenced Sections.

CSXT accepts TPI's calculation of the weighted average TPIRR state income tax rate.

4. Capital Cost Recovery

TPI calculated the capital recovery cost of TPIRR's property using a ten-year DCF period in accordance with the Board's decision in *Major Issues*, STB Ex Parte No. 657 (Sub-No. 1).[11] CSXT accepts TPI's capital recovery calculations except as set forth in other Sections of CSXT's III-G and III-H Reply Evidence.

[11] TPI Opening III-G-11.

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III. STAND-ALONE COST

H. Results of SAC Analysis

In this Section, CSXT discusses the results of its SAC DCF analysis and the application of the Board's Maximum Markup Methodology ("MMM") and cross-subsidy tests to the evidence in this case.

1. Results of SAC DCF Analysis

CSXT identified several problems with TPI's DCF model in Section III-G. There are other problems with TPI's DCF inputs and assumptions that logically could have been discussed in Section III-G. However, because TPI discussed these other issues in Section III-H, for the sake of consistency CSXT addresses them in Section III-H as well. The DCF implementation problems discussed here include TPI's improper change to the Board's standard debt amortization pattern; its extension of the benefits of bonus depreciation to the replacement cost of assets as they reach the end of their useful lives; and its use of the wrong tax depreciation lives for certain TPIRR road property assets. CSXT's corrected DCF analyses are set forth in CSXT Reply Exhibit III-H-1.

a. Cost of Capital

The cost of capital (Table A) for the TPIRR reflects the Board's annual cost of capital determinations for 2008 through 2012. The TPIRR's cost of debt for years 2008 to 2010 (the TPIRR's construction period) is assumed to equal the railroad industry average cost of debt for each specific year in the construction period. For years 2011 through 2020, the TPIRR's cost of debt equals 5.79% and reflects the weighted average of the construction years' debt costs. The TPIRR's cost of common equity for the years 2008 through 2012 is assumed to equal the railroad industry cost of common equity for each specific year. For years 2011 through 2020, the TPIRR's cost of equity equals 13.1% and reflects the simple average of the 2008 through 2012 amounts. CSXT accepts TPI's calculation of the DCF capital structure and cost of capital. As discussed in Section III-G-1, CSXT includes a separate additive to cover equity flotation costs.

b. Road Property Investment Values

CSXT's calculations for road property investment values are detailed in Table C of CXST Reply Exhibit III-H-1. CSXT replaced TPI's road property investments with those specified in Section III-F. CSXT accepts TPI's proposed TPIRR construction schedule.

For land investments, TPI's land valuation witness valued the TPIRR's real estate as of the beginning of SARR operations in 2010 rather than the acquisition date in mid-2008. CSXT accepts TPI's appraised values for properties other than those appraised by the CSXT land valuation witness, which are valued at mid-2008 levels. TPI's DCF indexes all TPIRR real estate values from mid-2010 levels to mid-2008 levels in the "Investment" tab. CSXT adjusted the TPI DCF to not apply the 2010 to 2008 index adjustment to the mid-2008 land values it developed. As explained in Section III-G-2, CSXT accepts TPI's land index.

c. Interest During Construction

CSXT calculated interest during construction on construction funds outstanding during the assumed TPIRR construction period using the same methodology as TPI.

d. Amortization Schedule of Assets Purchased with Debt Capital

In its opening, TPI proposed changing the Board's longstanding practice of amortizing SARR debt over 20 years. As justification for its proposed change, TPI asserts that a SARR's debt capital would mirror the type of debt instruments issued by U.S. Class I railroads included in the Board's annual cost of capital determination[1] and that if the Board's precedent assumes that the SARR's cost of debt should mirror the railroad industry cost of debt, the SARR debt

[1] *See* TPI Opening III-H-2.

should also mirror the composition of that debt and how the interest is paid to the debt holders. TPI suggests that nearly 90% of the railroad industry debt consists of corporate bonds, notes, and debentures that incorporate coupon payments of interest, rather than periodic payments with principal and interest components and proposes a similar coupon payment schedule for the TPIRR.[2] TPI asserts that absent such a switch, a mismatch occurs.[3]

Before addressing TPI's efforts to change a long-standing feature of the Board's DCF model, it is important to note that the Board, in its recent decisions in *DuPont* and *SunBelt*, rejected the very same argument raised by the complainants in those proceedings. *See DuPont*, STB Docket No. 42125, at 281-82, *SunBelt*, STB Docket No. 42130, at 191. The Board explained that because a SARR is evaluated through a regulatory lens, whereas the railroad industry itself is evaluated by the financial markets, it is not appropriate to structure the debt of a SARR in a manner that mirrors the way the railroad industry handles debt as the shipper argued in that case.[4] TPI applied the same twice-rejected rationale as the basis for its proposed change in this proceeding.[5]

In those decisions, the Board made it clear that its SAC test looks specifically to determine if a SARR can pay the cost of constructing, maintaining and operating its system and that the structure of the Board's DCF model assumes that a SARR's debt payments include both an interest and a principal component. It concludes that if, as shippers propose, the SARR pays only interest and no principal throughout the SAC analysis period, it has not completely paid for its assets. *DuPont*, STB Docket No. 42125, at 281; *SunBelt*, STB Docket No. 42130, at 191.

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[2] *Id.* at III-H-4.

[3] *Id.*

[4] *See DuPont*, STB Docket No. 42125, at 281.

[5] *See* TPI Opening III-H-2-3.

Further, TPI's focus on existing railroad debt instruments ignores the fact that the TPIRR will lock in its cost of debt at the debt rates in effect during the assumed construction period.[6] In asserting how the TPIRR would function under TPI's proposed coupon payment scheme, TPI acknowledged that railroads today do not lock in debt rates and instead issue new debt with new interest payments as existing debt matures.[7] TPI's tacit acknowledgement that in order for the TPIRR to mirror the railroad industry it would be required to issue new debt as shorter term instruments mature confirms that its proposal conflicts with the longstanding assumption that a SARR would lock in its debt rate at the rates in place during the construction period. *See, e.g.*, *Coal Trading Corp. v. Baltimore & Ohio R.R.*, 6 I.C.C. 2d, 361, 378-79 (1990). The Board affirmed its position on locking in the debt rate later in *McCarty Farms*. There, in the face of rising debt rates, the complainant advocated locking in the cost of debt for the SARR at the weighted average cost of debt during the three year construction period (8.25%) while Burlington Northern argued that the cost of debt should be based on the current cost of debt over the 20 year SAC analysis period (ranging from 6.9% to 14%.)[8] In accepting McCarty's position, the Board explained:

> We accept McCarty's use of a weighted average cost of debt based on debt costs for 1976 through 1978. The FRR would have been constructed with funds obtained between 1976 and 1978, and would have issued instruments reflecting investor expectations during that time period. Subsequent fluctuations in the cost of debt, reflecting post-construction market conditions, are irrelevant, because the FRR would not need to raise

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[6] TPI Opening III-H-1. The TPIRR's cost of debt for years 2008 through 2010, the TPIRR's construction period, is assumed to equal the railroad industry average cost of debt for each specific year in the construction period. For years 2011 through 2020, the TPIRR's cost of debt equals 5.79 percent and reflects the weighted average of the construction years' debt costs used through the remaining years of the DCF model.

[7] *Id.* at III-H-3.

[8] *See McCarty Farms,* 2 S.T.B. at 522.

> appreciable amounts of debt capital in the years immediately following construction (when debt rates were at peak levels).[9]

Here, in the face of declining interest rates, TPI seeks to reverse this settled precedent. However, there is a significant difference between locking in a specific debt rate and re-issuing debt, particularly as it relates to the actual average debt rate. When the Association of American Railroads ("AAR") calculates the railroad industry cost of debt for the Board's annual cost of capital determination, it calculates the average yield of the bonds, notes, and debentures that were traded during the year. These bonds, notes, and debentures include both instruments with relatively short intervals to maturity and correspondingly lower yields, and those with longer intervals to maturity and correspondingly higher yields. Table III-H-1 below segregates the 2008[10] traded debt instruments that the AAR used in its calculations between those with yields below the 2008 calculated average yield of 6.525% and those with yields above the average.

Table III-H-1
Breakdown of AAR 2008 Cost of Debt
Between Those With Yields Below and Above the Average Yield
($ millions)

2008 Instruments	Count	Market Value	Weight	Avg. Yield	Avg. Maturity Date	Avg. Years to Maturity
Below Avg.	22	$6,359.5	38.34%	5.72%	2014	4.6
Above Avg.	39	$10,229.6	61.66%	7.03%	2037	28.3
Average	61	$16,589.0	100.00%	6.53%	2028	19.2

Source: CSXT Reply Workpaper "AAR 2008 Cost of Capital Debt Details Worksheet.xlsx."

Table III-H-1 shows that 22 of the 61 debt instruments used by the AAR to determine the 2008 railroad industry average cost of debt have yields below the average, with an average yield of 5.72%, and that these instruments will mature and be paid in full in an average of 4.6 years. If the TPIRR had become tied contractually to a single note with a 20-year term with a maturity

[9] *McCarty Farms*, 2 S.T.B. at 522-23.

[10] 2008 is the first full year of the TPIRR construction period.

date of 2029, then its debt rate would be more in line with the higher average rates for longer term issues. By contrast, the longstanding assumption in the DCF model that debt will be amortized over a 20-year period—rather than that the principal will be paid in full at maturity—incorporates the concept that the cost of debt will reflect a mix that includes some instruments with shorter terms until maturity. In other words, TPI's decision to use the railroad industry's average cost of debt and the accompanying mix of short and long term maturities is consistent with the long-standing assumption in the DCF model that debt will be amortized throughout the 20 year period, not with an assumption that TPIRR could be financed with a note under which no principal would be paid for 20 years.

As discussed above, the current debt amortization schedule in the DCF was first adopted by the Interstate Commerce Commission in its 1990 decision in *Coal Trading Corp. v. Baltimore & Ohio R.R.*, 6 I.C.C.2d 361 (1990). That amortization assumption is consistent both with the AAR's calculation of the average debt yield and with the maturity schedules of the underlying instruments. CSXT corrects TPI's approach by applying Board precedent for both the amortization of debt on the initial TPIRR investment and for the debt amortization on the replacement cost of TPIRR assets as they reach the ends of their useful lives.

e. Present Value of Replacement Cost

CSXT makes two corrections to TPI's calculation of the replacement cost of TPIRR assets. As explained further below, CSXT corrected the tax depreciation lives for certain TPIRR assets from 15 to 20 years. CSXT also reestablished the 20-year debt amortization schedule for future asset replacement.

f. Tax Depreciation Schedules

TPI's tax depreciation schedules contain two errors. The first is that TPI assumes that the TPIRR would take full advantage of the bonus depreciation benefit for all road property assets.

TPI assumed a whopping $8.3 billion of the TPIRR's road property investment would be written off in the first year of TPIRR operation as bonus depreciation.[11] In its opening, TPI acknowledged the skepticism expressed by the Board in *AEPCO 2011* as to whether bonus depreciation allowed under the prior and current tax law should be allowed in SAC presentations. *See* TPI Opening III-H-9. TPI argues that not allowing a shipper to avail itself of the bonus depreciation provisions taken and used by the railroad companies, however, would create a barrier to entry and place the shipper at a distinct disadvantage relative to the incumbent railroad. On the contrary, it is TPI's assumption that the TPIRR would avail itself of the bonus depreciation benefits for virtually all of the TPIRR's road property investment that would inappropriately place the TPIRR at a distinct *advantage* relative to the incumbent CSXT. Unlike the TPIRR, which benefits from the stand-alone assumptions of unconstrained resources and no barriers to entry that allow for all of the TPIRR construction to occur during the limited bonus depreciation tax window, CSXT built its system and periodically replaces components of its system over many years. As such, its ability to take advantage of the limited window of opportunity for bonus depreciation is constrained. To allow the TPIRR to maximize its benefit from a temporary tax shelter because of a simplifying stand-alone cost assumption would result in creation of a reverse barrier to entry that would bestow cost savings to a new hypothetical entrant that were not available to the incumbent.

In its recent decisions in *DuPont* and *SunBelt*, the Board rejected similar arguments made by defendant Norfolk Southern ("NS") on the grounds that because the SARR must bear any disadvantages of its construction timing, it should not be denied the tax advantages available during that same time period. The Board, however, did not identify what those disadvantages

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[11] TPI Op. WP "Exhibit III-H-1.xlsm," Tab "Tax Depreciation", cells C69-70.

might be and, as CSXT explained above, the Board's own theories of unconstrained resources and barriers to entry virtually eliminate any construction related obstacles a new entrant would actually encounter. The Board's positions in *DuPont* and *SunBelt* are inconsistent with sound SAC theory and with prior SAC precedent, and distort the SAC analysis and results.

The Board cites *Coal Trading* and *McCarty Farms* in support of its rulings on bonus depreciation. *See DuPont*, STB Docket No. 42125, at 278. Those decisions addressed the assumption of unconstrained resources as the basis for assuming the SARR could be constructed in an impossible (in the real world) three-year window. *See id.* As the Board recognizes, this assumption allows the SARR to obtain substantial "efficiencies unavailable to the incumbent" in the real world. *See id.* Those decisions do not hold that the SARR is also entitled to claim any and all additional benefits and advantages that might be available to it solely as a byproduct of the artificially short construction period assumption. Such a ruling would artificially compound the advantages the SARR has over the incumbent by assuming cost savings that would not be available to even a least-cost most-efficient carrier. This in turn would distort the SAC analysis by driving certain SARR investment costs below levels feasible or attainable in the real world. The Board should allow the SARR to assume it would obtain the same tax benefits obtained by the incumbent carrier, but should not allow the unrelated assumption of unconstrained resources to confer tax benefits on the SARR that were not available to the incumbent. In *West Texas*, the Board accepted complainant WTU's definition of barriers to entry as any costs that the new entrant must incur that were not also incurred by the incumbent, and explained that the definition is consistent with its regulatory purpose of constraining a railroad from monopoly pricing. *West Texas,* 1 S.T.B. at 670. The Board explained that its interpretation of barriers to entry is consistent with its view of the SARR as a replacement carrier that steps into the shoes of the incumbent carrier for the segment of the rail system that the SARR would serve. *Id.* Because the incumbent CSXT did not enjoy the full benefits of the limited-time bonus depreciation provision, a replacement carrier stepping into its shoes (the TPIRR) should not be assumed to enjoy such additional benefits.

In its Reply, CSXT has assumed that the TPIRR should be allowed to enjoy the benefits of bonus depreciation only to the extent that CSXT itself has been able to enjoy them. Specifically, using CSXT tax returns produced to TPI in discovery, CSXT calculated that it enjoyed system-wide $1.896 billion in bonus depreciation benefits over the 2008–2010 time frame. The TPIRR is assumed to replace CSXT for 6,866 of its 2010 total route miles of 15,989, or 43% of the full CSXT network. As such, CSXT limited the amount of bonus depreciation available to the TPIRR to 43% of CSXT's total 2008–2010 benefit of $1.896 billion, or $814 million.

The second error is that TPI's tax depreciation schedules use the wrong tax depreciation lives for certain of the TPIRR's road property assets. Specifically, TPI assumed certain accounts qualify for 15-year lives when, under IRS rules, they actually qualify as 20-year properties. Internal Revenue Code § 168(e) specifies the rules for the classification of property for purposes of computing the cost recovery allowance provided by the Modified Accelerated Cost Recovery System ("MACRS")—the tax depreciation system used in the United States. Property is classified according to class life as determined in Revenue Procedure 87-56 unless statutorily classified otherwise in § 168.[12] There are no exceptions to this rule. The following assets are specifically listed under asset class 40.2, and each carries a 20-year tax life:

[12] *See* CSXT Reply WP "Rev. Proc. 87-56 – 5.rtf."

- Account 6 - Bridge & Trestles
- Account 13 - Fences & Roadway Signs
- Account 17 - Roadway Buildings
- Account 19 - Fuel Stations
- Account 20 - Shops & Enginehouses
- Account 39 - Public Improvements

The Board affirmed the 20-year tax treatment of these assets in the *DuPont* and *SunBelt* cases. *See DuPont*, STB Docket No. 42125, at 279; *SunBelt*, STB Docket No. 42130, at 189. Further confirmation that CSXT treats these accounts as 20-year properties for tax depreciation purposes can be found in CSXT bonus depreciation documents for 2008 through 2010 produced to TPI in discovery.[13] These documents show that approximately two percent of property placed in service in 2008 through 2010 was classified as 15-year property, while over 11% of the property placed in service in those years was classified as 20-year property.[14]

For each of these asset categories, CSXT changed the depreciation period from 15 years to 20 years and updated the depreciation percentages to comply with the proper 20-year MACRS table.[15]

g. Average Annual Inflation in Asset Prices

CSXT accepts TPI's inflation assumptions, but updates the Global Insight RCAF forecast with its March 2014 release.

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[13] *See* CSXT Reply WPs "Depreciation and Amortization 2008.pdf", "Depreciation and Amortization 2009.pdf" and "Depreciation and Amortization 2010.pdf."

[14] *See* CSXT Reply WP "15 and 20 year property.xlsx."

[15] *See* CSXT Reply WP "MACRS tables.pdf."

h. Discounted Cash Flow

As explained in detail above in Section III-G-4, CSXT accepts generally TPI's proposal to calculate the terminal value after year ten. In its Opening, TPI claimed to have identified an additional flaw in the STB's model. TPI observes that the DCF model explicitly assumes that the SARR's capital structure will remain constant in perpetuity. This means that the amounts of common equity and debt carried on the TPIRR's financial statements will remain the same forever. However, the STB's DCF model assumes that after year 20, and until the first assets are replaced in the replacement cycle of the DCF model, the railroad has no debt and no tax shielding interest payments. Stated differently, the model assumes, from a tax payment perspective, that the railroad is 100% equity financed after year 20 and before its first replacement cycle. According to TPI, this creates an irreconcilable mismatch between the TPIRR's cost of capital and its cash flows. The cost of capital assumes that the TPIRR is carrying debt and its associated interest payments, but the cash flows reflect no benefits from the interest tax shields.

TPI proposed to correct the perceived mismatch by assuming, contrary to long established Board precedent and contrary to its own explicit assumption that the term of the TPIRR debt is 20 years, that interest payments on the full balance of the TPIRR's debt would continue beyond year 20 and in perpetuity. The mismatch "discovered" by TPI has been a mainstay of the Board's DCF model since *Coal Trading* and *McCarty Farms* and was affirmed by the Board in *Major Issues* in which the shippers' proposal to change to the amortization of debt assumptions in the DCF model was rejected by the Board as beyond the scope of the proceeding.[16] TPI's attempts to again raise the issue in the context of this proceeding should be similarly dismissed.

TPI proposes to extend the TPIRR interest payment into perpetuity, which does not remedy the perceived mismatch it identified. As discussed above in Section III-H-1-d, the TPIRR cost of debt is locked in at the rates in place during the TPIRR construction period and the rates are based on a collection of short and long term debt instruments. TPI's assumption that these rates will remain in effect in perpetuity creates a new mismatch between the interest rate and the debt term.

This issue was squarely argued before the Board in *DuPont* and *SunBelt*. In its decisions in those proceedings, the Board accepted shippers' arguments that adjustments to the terminal value calculations were necessary. However, in *DuPont*, the Board's DCF work papers supporting that decision failed to make any changes to its calculation of the terminal value. In *SunBelt*, the Board expanded its discussion to explain that in order to accommodate its decision of a 20 year amortization period for the initial SARR debt, the shippers' proposed remedy needs to be modified. Consistent with that finding, the Board based the straight line average of the SARR interest payments over the 20-year amortization period and included the capitalized value of that projected payment stream in the calculation of the terminal value at the end of the ten year DCF period.

In making this change, the Board acknowledged the inconsistencies in the current DCF model relative to its assumptions regarding the 20-year amortization of SARR debt and the capital structure implicit in the DCF model.[17] It stated that in accepting DuPont's proposed

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[16] *Major Issues*, STB Ex Parte No. 657 (Sub-No. 1) at 65.

[17] *See DuPont*, STB Docket No. 42125, at 283.

change that it was resolving one aspect of the complex model inconsistencies "rather than creating a new one."[18]

There are two significant problems with the Board's proposed modifications to the DCF terminal value calculations, one that is conceptual and the other mathematical. On the conceptual side, if implemented, the Board's acceptance of shippers' proposed adjustment to the terminal value calculation would introduce a new, unwarranted and problematic inconsistency into the already complex DCF model by explicitly applying different financial assumptions to a SARR's initial acquisition of assets and its subsequent replacement of assets as they are assumed to wear out. Specifically, before any changes to the terminal value calculations, the DCF was configured to apply the same financial assumptions to the SARR's initial investment and to the subsequent replacement of assets as they are projected to wear out. These assumptions include that the SARR's initial debt and the debt incurred as part of the replacement of worn out assets would be amortized over 20 years. Under the Board's findings in *SunBelt*, the initial debt would still be amortized over 20 years, but there would be no amortization of debt for assets in the subsequent replacement cycles. Instead there would be an interest-related adjustment for tax purposes based on the average of the interest over the initial 20 year amortization. The Board provided no explanation regarding how or why the financial assumptions surrounding the acquisition of SARR assets should differ prospectively from those applied to the initial acquisition.

The mathematical problem was introduced by the Board in its attempts to reconcile the 20 year amortization period with its decision to assume constant annual interest payments equal to the average of the interest payments over the 20 year amortization period. Based on its

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[18] *Id.*

description of its proposed adjustment of using the straight-line average of the interest payments over the amortization period in the calculation of the terminal value, it appears that the Board's reconciliation effort results in a double count of some measure of SARR interest. The Board determined that the future interest payments should be based on the average of the interest payments over the 20 year amortization period, but it does not wait until the end of the 20 year amortization period before applying the new interest calculation. As a result, the SARR interest payments for years 11 through 20 are overstated by the difference between the average annual interest and the lower average annual interest payments at the back end of the amortization period as the principle balance declines.

If the Board wanted to correctly address the new mismatch issue raised by TPI, it should revert back to the version of the DCF used in *Coal Trading* and recalculate the TPIRR capital structure in each period as the debt is amortized.[19] In that decision the ICC agreed with defendants' position that the DCF debt to equity ratio would not remain constant and that as the SARR amortized debt, the debt to equity ratio will change, resulting in a greater portion being equity capital.[20] This approach would maintain both the relationship between the locked in debt rate and the terms associated with those rates and make the capital structure consistent with the debt amortization schedule.

Absent that, the Board should not make any changes to the long standing terminal value calculations. In its reply, CSXT discounts the remaining debt interest payments and tax depreciation back to the final quarter of the 10-year DCF to calculate the TPIRR's terminal value, consistent with the approach used by the Board in *AEPCO 2011*.

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[19] *Coal Trading Corp. v. Baltimore & Ohio R.R.*, 6 I.C.C.2d 361, 379 (1990).

[20] *Id.*

CSXT made one other necessary change to the DCF model. Certain costs related to PTC interoperability will not be incurred by the TPIRR until after commencement of operations. As such, special accommodations need to be made to the DCF to recover PTC interoperability related investment only after that investment has been incurred. This was accomplished in a manner generally consistent with the approach taken in the DCF for the replacement of assets as they reach the end of their useful lives. Specifically, a new tab "PTC" was created in the DCF that functions similarly to the "Replacement" tab that calculates future replacement costs. TPIRR PTC investments for the years 2011 through 2015 were input to the new tab where the tax benefits from accelerated depreciation and tax deductible interest are calculated and deducted from the PTC investment. The present value of future PTC investments as the original equipment reaches the end of its useful life is also computed for each investment vintage.

The PTC investments net of tax benefits and the present value of future replacements are carried to the "Investment SAC" cash flow tab. The model is first run with no future PTC investment to establish the base line capital recovery. Then, beginning with 2011, each year's PTC investment is added to the investment total and the model rerun. To prevent recovery of PTC investment before the actual PTC expenditures take place, the model results are locked down for the prior year before the model is rerun with the next year's PTC investment. For example, before the 2011 run is made, the annual capital recovery for 2010 is saved as values and included as part of the 2010 run outputs.[21] Details of these calculations are set forth in the "PTC" and "Investment SAC" tabs of CSXT Reply Exhibit III-H-1.

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[21] In other words, the formula is removed from the spreadsheet cell and replaced with the value calculated in the prior year's iteration. This method prevents the calculated values from being influenced by PTC investments in later years.

i. Computation of Tax Liability—Taxable Income

CSXT accepts TPI's assumed federal tax rate of 35% and calculated composite state income tax rates for the TPIRR.

j. Operating Expenses

CSXT corrected the Base Year operating expenses as detailed in Section III-D. For the annual adjustment of operating expenses, TPI used gross ton miles instead of the Board's standard use of tons to take into consideration the shifting nature of the TPIRR's traffic. TPI Opening III-H-11. CSXT accepts TPI's use of gross ton miles and indexes TPIRR operating expenses based on its calculations of annual changes in TPIRR gross ton miles using its reply operating plan.

As described in Sections III-D-1-c-i and III-G-2, CSXT modifies the DCF to calculate TPIRR fuel costs for the fourth quarter of 2010 through the fourth quarter of 2013 by applying CSXT's actual quarterly average fuel price to TPIRR third quarter 2010 service units as adjusted for changes in TPIRR traffic levels based on changes in TPIRR gross ton miles. CSXT also modifies the Board's Hybrid RCAF index by substituting the All Inclusive Index – Less Fuel (AII-LF) for the RCAF index in the DCF Hybrid index for 2010 through 2013 and applies that index to only the TPIRR non-fuel expenses. CSXT returns to application of the Board's standard Hybrid RCAF to all TPIRR operating expenses after 2013.

Also, as described in more detail in Section III-D-9, CSXT in its reply adds the North Baltimore, OH, intermodal facility to the TPIRR. That facility, however, did not fully come on line until 2012. The source document from which TPI developed TPIRR's intermodal lift and ramp costs indicates that CSXT's lifts and loads at North Baltimore increased significantly from { } in 2010 to { } by 2013. To capture properly the ramp up in operating expenses for this new facility, CSXT substituted for the annual change in gross ton miles used in the DCF to capture changes in traffic levels the actual number of lifts occurring at this facility over the 2010 to 2013 time period. CSXT applies changes in gross ton miles to reflect further changes in traffic levels beyond 2013.

k. Summary of SAC Analysis

CSXT's stand-alone costs and revenues for TPIRR are presented in Table L of Exhibit III-H-1 on a quarterly and annual basis and summarized in Table III-H-2 below.

Table III-H-2
CSXT Reply TPIRR SAC Results ($ millions)

Year	SARR Revenue Requirement	SARR Revenues	Overpayments (Shortfalls)	Present Value
3Q2010 - 4Q2010	$3,923	$2,941	($982)	($982)
2011	8,349	6,476	(1,873)	(1,679)
2012	8,642	6,723	(1,919)	(1,546)
2013	8,768	7,008	(1,761)	(1,280)
2014	9,082	7,456	(1,626)	(1,063)
2015	9,426	7,840	(1,587)	(933)
2016	9,782	8,360	(1,422)	(752)
2017	10,157	8,742	(1,414)	(672)
2018	10,552	9,207	(1,345)	(575)
2019	10,938	9,684	(1,254)	(482)
1Q2020 - 2Q2020	5,621	5,084	(537)	(196)
Cumulative Net Present Value				**($10,160)**

The results in Table III-H-2 show that the revenues available to the SARR are not sufficient to cover the full SAC costs of the SARR over the ten-year analysis period. In fact, TPIRR would experience a cumulative revenue shortfall of over $10 billion. Thus, TPI has failed to demonstrate that the challenged rates are unreasonably high.

2. Maximum Rate Calculations

CSXT's Reply Evidence shows that the Board should have no reason to apply the MMM, because the challenged rates do not exceed a maximum reasonable level and no rate prescription is warranted. However, if the Board were to find that TPIRR's SAC revenues exceed its SAC costs, it should correct TPI's proposed application of MMM to index URCS costs for future years using RCAF-A, in accordance with governing precedent, and reject TPI's proposal to use a different approach used in different contexts and for different purposes.

a. If It Applied MMM, the Board Would Need to Correct TPI's Index.

TPI used the wrong index to adjust the MMM URCS costs for the years 2011 through 2020. Instead of using the RCAF-A, which includes the effects of projected productivity in the railroad industry, as instructed by the Board in its 2009 decision in *AEP Texas v. BNSF Ry. Co.*, STB Docket No. 41191 (Sub-No. 1), at 14 (STB served May 15, 2009), TPI relied on a strained construction of the Board's decision in *OG&E*[22] to rationalize the use of the Board's standard URCS indexing approach, which does not capture any projected productivity benefits in the MMM analysis.[23] The *OG&E* decision is inapposite here, because it involved short-term indexing of URCS costs to inflate them only for specific quarters within one year and not across years. The instructive language from the decision reads as follows:

> Therefore, to determine the maximum lawful rates it may charge under this decision, UP must calculate variable costs in a given quarter by using the most recent URCS data indexed to that quarter by using the most recent AAR indices and PPI. UP should then combine those data with the actual operating characteristics to estimate a given movement's variable cost. This is the best estimate of variable cost that will be available at the beginning of a quarter. UP should then multiply the stipulated maximum lawful R/VC ratio by the variable costs to calculate the rate to be charged in that quarter. UP is directed to update the maximum lawful rate quarterly in order to reflect the most recent URCS data and indices. (For instance, when the Third Quarter PPI becomes available by November 1, 2009, UP will update the maximum lawful rate to reflect these data.) Thereafter, through the end of 2018, UP shall update the maximum lawful

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[22] *Oklahoma Gas & Elec. Co. v. Union Pac. R.R.*, STB Docket No. 42111 (STB served July 24, 2009).

[23] TPI Opening III-H-12.

> rate quarterly to reflect the most current URCS data and indices available.[24]

The Board required UP to update its rate calculations four times per year.[25]

In its decisions in *DuPont* and *SunBelt*, the Board jettisoned its precedent of adjusting URCS costs in the MMM model by the RCAF-A and agreed with the shippers' argument that because the URCS indexing will take into account the costs weightings of the incumbent (as opposed in inclusion of all railroads in the RCAF-A), it better achieves the goal of the exercise to forecast the defendant railroad's variable cost. Missing from the Board's reasoning is its directive in *OG&E* for UP to base its calculations on the most recent URCS when those data become available. The Board has historically released its URCS runs for the industry in the fourth quarter of the following year.[26] Under that schedule, in order to produce quarterly updated rates, the latest URCS results would require indexing for an average of approximately two years. URCS unit costs capture both year to year changes in input prices and railroad productivity. As such, the *OG&E* rate calculations capture the effects of productivity, albeit with a two year lag.

The Board's standard URCS index is an input price index and, unlike RCAF-A or the rate calculations under the OG&E decision, does not reflect improvement in railroad productivity. TPI's proposal to forecast URCS costs using only the URCS input price index will, other things being equal, overstate forecasted URCS costs compared with what the actual URCS costs, including productivity, will be. This will distort any MMM based rate prescription by

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[24] *Oklahoma Gas & Elec. Co. v. Union Pac. R.R.*, STB Docket No. 42111, at 11 (STB served July 24, 2009).

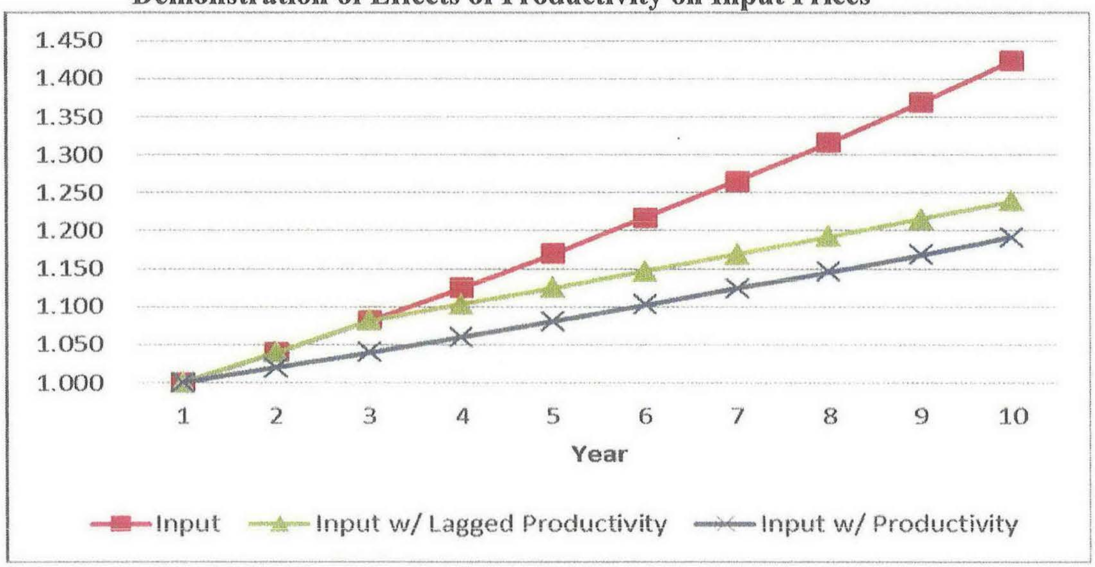
[25] *Id.* at 11, n.16.

[26] The Board's URCS release is sometimes delayed as a result of procedural matters or errors in the carriers' reporting data.

calculating the MMM prescribed R/VC on a forecasted variable cost estimate that does not include the effects of railroad productivity and applying that prescribed R/VC to actual URCS cost years down the road that will include the effects of productivity. This will understate the prescribed rate.

Chart III-H-1 below compares the forecasted performance of (1) an input price index, which for purposes of this discussion is comparable to the URCS index; (2) an input price index adjusted to reflect productivity, similar to the RCAF-A; and (3) an input price index that reflects the productivity on a two year lag, similar to the *OG&E* approach, with input price inflation estimated at four percent annually and productivity at two percent.

Chart III-H-1
Demonstration of Effects of Productivity on Input Prices



Source: CSXT Reply WP "URCS Index Productivity Demonstration.xlsx."

As Chart III-H-1 shows, productivity can have a considerable effect, particularly in the out years. The Board has stated that the goal of the MMM index is to generate an accurate forecast of defendant's variable costs,[27] which include the effects of productivity. As such, an

[27] *SunBelt*, STB Docket No. 42130, at 196.

input index that captures projected productivity is, all other things equal, more likely to achieve the Board's stated goal than an index that bases its weightings on costs for one of the four major railroads included in the RCAF-A. The Board had this right when it used the RCAF-A approach in *AEP Texas, Western Fuels, and AEPCO 2011*, and CSXT here follows those early precedents and applied a forecast of the RCAF-A as the basis for forecasts of variable costs in the MMM model.

If the Board still believes that an index weighted with the defendant railroad's costs are more appropriate, it should apply the RCAF-A forecasted productivity to its standard URCS index. CSXT in its Reply has included a version of TPI's Opening URCS index adjusted for forecasted railroad industry productivity as reflected in the RCAF-A in its work papers.[28]

3. If The Board Were to Find That The TPIRR Revenues Exceed SAC Costs Over The 10-Year DCF Period, It Must Administer An Internal Cross-Subsidy Test.

CSXT's Reply Evidence shows that under reasonable and supported assumptions for traffic and revenue forecasts, a properly developed operating plan that serves all TPIRR customers and construction costs that account for the conditions that will be encountered by the builders of the TPIRR, stand-alone revenues exceed stand-alone costs over the ten-year DCF period. If the Board were to determine otherwise, however, it would be required to conduct a cross-subsidy analysis along the TPIRR network to ensure that each segment covers the costs attributable to serving that traffic and is therefore not receiving an impermissible cross-subsidy from traffic with which it does not share facilities.[29] If any analysis of the individual line segments of the TPIRR demonstrates an improper cross-subsidization, then the issue traffic

[28] *See* CSXT Reply WP "MMM CSXT URCS Index Reply.xlsx."

[29] Witness Michael Baranowski sponsors the cross-subsidy analysis described in this Section of CSXT's Reply Evidence. *See* Section IV *infra.*

moving over the segment being cross-subsidized must be dismissed from this case. *See, e.g., Otter Tail*, STB Docket No. 42071, at 23-30; *PPL Montana*, 6 S.T.B. at 297-300. Further, if the Board determines that overall projected TPIRR revenues for any cross subsidy segment exceed that segment's revenue requirements, but relatively less than those of the overall TPIRR, then the internal cross-subsidy analysis would limit the amount of rate relief the Board could prescribe for issue traffic moving over the cross subsidy segment. *See Otter Tail,* STB Docket No. 42071, at 10-11.

As described in more detail below, CSXT has conducted an internal cross-subsidy analysis on TPI's opening configuration for the TPIRR for the 14.6 mile segment in Indiana from Seymour to North Vernon. This segment failed the Board's standard test. If the Board determines—contrary to CSXT's sound and well-supported evidence—that SAC revenues exceed SAC costs (*i.e.*, SAC revenue requirement) for the TPIRR, it must conduct internal cross subsidy analyses on the TPIRR segments using the revenues and costs the Board has determined. The analyses conducted by CSXT can be used by the Board to update the cross-subsidy results for this segment and as a template for additional analyses by the Board should such analyses become necessary.[30]

a. Background

The TPIRR, as designed by Complainant, replaces nearly 7,000 CSXT route miles. Although it replicates a number of CSXT's premier high density route, the TPIRR also includes a number of lower density segments and branch lines that, once final SAC costs are determined by the Board, may be found to have impermissible cross-subsidies.

[30] *See* CSXT Reply WP folder "III-H/Cross Subsidy."

b. The Board's Internal Cross-Subsidy Test is Essential to Prevent Subsidization of the Issue Traffic by Other Shippers Who Do Not Benefit from Facilities Used By the Issue Traffic.

The Board's internal cross-subsidy test, first applied in *PPL Montana,* is designed to ensure that a complainant's SAC analysis does not rely upon cross-subsidization of the issue traffic by other traffic that does not use facilities needed by the issue traffic. As the Board explained, the *Coal Rate Guidelines* and Constrained Market Pricing proscribe "both cross-subsidization by and *cross-subsidization of" the issue traffic. PPL Montana*, 6 S.T.B. at 295 (emphasis added). A prohibited cross-subsidy arises when any traffic would be required to pay for facilities that it does not use or when that traffic would pay costs that are attributable to other traffic. *Id.* at 295-96. As the Board has further explained, a complainant may not prevail in a SAC case "by shifting responsibility for paying for facilities it uses to other shippers who do not benefit from those facilities." *Otter Tail*, STB Docket No. 42071, at 24 (quoting *PPL Montana,* 6 S.T.B. at 757-78).

> The internal cross-subsidy test . . . flows naturally from the economic theory of contestable markets, upon which the SAC test rests. . . . If the revenues from traffic using one part of a system are less than the costs attributable to that traffic, there would be no economic incentive for a SARR to enter the market to serve those shippers. And when the existing rates are less that the sustainable rates in a contestable market, those rates do not exceed the maximum reasonable level established by the SAC test.

Id. If, based on an internal cross-subsidy analysis, the Board determines that the challenged rates do not exceed the maximum reasonable level established by the SAC test, the case must be dismissed. *See id.,* at 30.

The fact that a challenged rate may generate a relatively high R/VC ratio is neither relevant to a cross-subsidy analysis nor inconsistent with a finding that a segment of a SARR is cross-subsidized by other traffic that does not use that segment. As the Board has made clear, it is entirely appropriate and consistent with CMP and contestable markets theory that a solely served shipper whose traffic moves on a relatively light density line may be required to bear a larger portion of the costs of that line than it would have to bear if were located on a more heavily used line. *See Otter Tail,* STB Docket No. 42071, at 25 ("A captive shipper may well have to bear a greater portion of the costs of the infrastructure required for a lightly used line. But . . . it would 'turn the CMP principle against cross-subsidization on its head to protect a captive shipper from subsidizing other traffic, while at the same time allowing that shipper's rates to be subsidized by other traffic.'").

The question in an internal cross-subsidy analysis is not whether the rates in question are, judged by some subjective standard, "high," it is whether revenue generated by the challenged rate, in combination with revenue from other SARR traffic sharing the same facilities, exceeds the attributable costs of serving that group of shippers. If the answer is no, then the traffic using the facilities in question is impermissibly cross-subsidized by other traffic that does not use those facilities, and the Board must dismiss the rate complaint. *See Otter Tail,* STB Docket No. 42071, at 24-25; *PPL Montana,* 6 S.T.B. at 296 (the internal cross-subsidy test determines "whether there is a readily identifiable subset of traffic that would not cover the collective attributable costs associated with serving the traffic.").

After the Board has determined that a SARR's revenues exceed its costs, the Board's internal cross-subsidy test analyzes "whether there is a readily identifiable subset of [SARR] traffic that would not cover the collective attributable costs of that traffic." In order to make that determination, the Board: (i) calculates SARR stand-alone costs (road property investment and operating costs) attributable to the identified set of traffic; (ii) determines the expected SARR revenues attributable to that traffic; and (iii) compares (i) and (ii) using a discounted cash flow analysis. If the present value of standalone costs of the identified traffic set exceeds the present value of the revenues from that traffic, then the identified traffic relies on an impermissible cross-subsidy from other traffic. If the cross-subsidized traffic group includes the issue traffic, then the complainant has failed to demonstrate it is paying more than necessary for efficient service or that it is cross-subsidizing other parts of the defendant carrier's network, and the rate complaint must be dismissed. *See Otter Tail,* STB Docket No. 42071, at 25-30.

A second application of the internal cross-subsidy test is as a limit on potential rate relief. In a case in which the Board does not identify a proscribed internal cross-subsidy and its SAC analysis determines that SAC revenues exceed the SAC revenue requirement, the Board must ensure that any rate prescription does not itself create an impermissible cross-subsidy. *See Otter Tail,* STB Docket No. 42071, at 10-11. In order to avoid creating such a cross-subsidy in the rate prescription process, the Board must again compare the costs and revenues attributable to the identified subset of SARR traffic and ensure that any rate prescription process does not reduce the difference between attributable costs and attributable revenues to less than zero, which would mean that other traffic would be required to subsidize the identified subset of traffic. Thus, in cases resulting in a rate prescription, the internal cross-subsidy analysis may also act as a cap on the amount of rate reduction the Board may order.[31]

c. Application of the Threshold Cross-Subsidy Test To Individual Segments of the TPIRR Network Would Demonstrate That Certain Issue Traffic Lanes Must Be Dismissed From the Case.

The TPIRR includes several relatively low density lines, and CSXT conducted the Board's standard cross-subsidy test on one of these lines using TPI's opening stand-alone costs and revenues. Although CSXT's Reply Evidence shows that a proper application of the Board's stand-alone cost procedures produces total costs for the TPIRR that exceed available revenues by

[31] Of course, the amount of rate relief that may be awarded is also limited by the 180% R/VC ratio floor on rate prescriptions, but that limit is not directly at issue in the cross-subsidy analysis.

a comfortable margin, if the Board were to find that revenues exceed costs, then the Board's internal cross-subsidy test would have to be administered to determine whether there were sufficient revenues available on these, and other segments to cover the costs properly attributable to them.

CSXT developed as part of its Reply Evidence a cross-subsidy analysis for a 14.6 mile segment in Indiana from Seymour to North Vernon. Using TPI's opening costs and revenue assumptions, CSXT determined that even with TPI's inflated revenues and understated costs, this line segment failed the test. As such, the carloads of issue traffic moving over these lines should be dismissed from the case. The workpapers for this analysis can be used by the Board as a template to administer its internal cross-subsidy test for this and other line segments in the event it finds that TPIRR revenues exceed its costs.

In conducting its cross-subsidy analyses, CSXT applied the procedures and assumptions that the Board used in *Otter Tail.* CSXT first estimated the road property investment that is attributable to each segment. CSXT then estimated the portion of each operating expense category that should be attributed to each segment, using a bottom-up approach to calculate direct operating expenses,[32] and an URCS-based approach to calculate indirect operating expenses,[33] just as the Board did in *Otter Tail* (CSXT did not make any further refinements to the Board's approach). *See Otter Tail*, STB Docket No. 42071, at 25-29. CSXT's application of the Board's standard cross subsidy test to this TPIRR segment reveals that the segment is being improperly cross subsidized.[34] As such, the TPI issue traffic that traverses this segment should be dismissed from the case.

[32] *See* CSXT Reply WP "XSub Operating Expense.xlsx."

[33] *See* CSXT Reply WP "Reply Exhibit III-H-1 XSub.xlsm," Tab "Indirect Opex."

[34] *See* CSXT Reply WP "Reply Exhibit III-H-1 XSub.xlsm."

In short, even if the Board were to conclude that the TPIRR's revenues exceeded its costs, it is highly likely that the TPIRR would rely on improper cross-subsidization of the issue traffic on multiple TPIRR segments. CSXT has provided the Board with detailed workpapers that permit it to perform a cross-subsidy analysis if one should be necessary. Other examples of low-density segments that should be evaluated for cross-subsidies if a cross-subsidy should be necessary are the 9-mile segment in Jackson, Tennessee, the 10-mile segment between Francesville and Monon in Indiana, and the 29-mile segment in Florida from Oneco to Big Bend.

TABLE OF CONTENTS

IV. WITNESS QUALIFICATIONS AND VERIFICATION

DHARMA ACHARYA

Dr. Acharya is an Assistant Vice President – Operations Research at CSX Transportation in the department of Service Design. Dr. Acharya's office is located at 500 Water Street, Jacksonville, Florida 32202. Dr. Acharya is sponsoring portions of Section III-C of CSXT's Reply Evidence related to MultiRail. A copy of his verification is attached hereto.

Dr. Acharya earned his Ph.D in Transportation Systems from the Massachusetts Institute of Technology in 1990. He holds a Master of Science degree from the University of Massachusetts at Amherst, and a Bachelor of Science in Highway Engineering from Tong-Ji University in Shanghai, China. Dr. Acharya's has over 20 years of experience at CSXT. His responsibilities at CSXT include providing analytical support to the Senior Management team. He also has responsibility for developing, acquiring, utilizing and implementing decision support systems to help maintain CSXT's operating plans and improve utilization of resources such as locomotives, crews, cars, and track. A number of decision support tools developed by his team have become an integral part of day-to-day business processes at CSXT.

Dr. Acharya has presented numerous papers on topics including railroad network optimization and has served in various official positions, including as a past Chairman, of the Rail Application Section of the Institute for Operations Research and Management Science (INFORMS).

Dr. Acharya's complete curriculum vitae is attached.

VERIFICATION

I, Dharma Acharya, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Dharma Acharya

Dharma Acharya

Executed on this 3 day of July 2014.

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WORK EXPERIENCE

CSX Transportation **Jacksonville, FL**
July 1994 – Present
Assistant Vice President – Operations Research (current position): Lead analytical teams to support various multi-million dollar corporate initiatives designed to improve railroad operations; developed and implemented operations research tools to assist in creating better railroad operating/service plans; supervised outside consulting teams working on designing and developing critical decision support systems for CSX; analyzed network databases to assist Senior Management in making various strategic decisions.

Association of American Railroads **Washington, D.C.**
January 1990 – July 1994
Sr. Research Engineer: Developed decision support systems using operations research and expert systems techniques for identifying better railroad operations and maintenance plans and schedules; conducted economic assessments of alternative technologies such as automatic train control system, intermodal containers for transporting finished automobiles, advanced railroad turnouts, and wheel impact detectors for removing high impact load wheels; developed life-cycle costing and track component deterioration and replacement scheduling models.

Center for Transportation Studies, M.I.T. **Cambridge, MA**
February 1985 - January 1990
Research Assistant: Assisted in the development of a rail relay scheduling system for the Burlington Northern Railroad Co., developed a maintenance management system for the inland water transportation facilities, assisted in the development of productivity measures and cost models for the Association of American Railroads, developed unit train performance measures for the Egyptian Railroad.

Burlington Northern Railroad Co. **Overland Park, KS**
Summer 1988
Student Intern: Assisted in developing 1989 rail relay program for the system; developed techniques to analyze and summarize electronic rail profile measurement data; interviewed BNRR's and other railroads' track maintenance experts about their rail relay and budgeting processes; developed a set of rail relay decision trees and tables.

Dharma R. Acharya

Department of Civil Engineering, UMASS **Amherst, MA**
September 1983 - January 1985
Research Assistant: Reviewed and evaluated hand-held portable microcomputers for the purposes of tabulating traffic and transportation data; assisted in the analysis of efficiency and equity implication of public transit services; conducted on-board bus survey data analyses using the SPSS statistical software.

EDUCATION

Massachusetts Institute of Technology **Cambridge, MA**
Ph.D. in Transportation Systems, February 1990
Thesis Title: "Using Expert Systems and Network Optimization Techniques for Rail Relay Scheduling."

University of Massachusetts **Amherst, MA**
Master of Science in Civil Engineering with Concentration in Transportation Engineering, May 1985
Thesis Title: "An Examination of Portable Microcomputers to Collect and Summarize Turning Movement Data and to Analyze Capacity at Signalized Intersections."

Tong-ji University **Shanghai, The People's Republic of China**
Bachelor of Science in Civil Engineering with Concentration in Highway Engineering, July 1983

PUBLICATIONS AND CONFERENCE PRESENTATIONS

Acharya, Dharma, "Mathematical Programming Applications at CSX Transportation," Presented at the **17th International Symposium on Mathematical Programming**, August 7-11, 2000, Georgia Institute of Technology, Atlanta, Georgia.

Acharya, Dharma, "Preparing for the Conrail Acquisition at CSX Transportation," presented at the **Institute For Operations Research and Management Science (INFORMS)** Conference, Spring 1999, Cincinnati, Ohio.

Acharya, Dharma, "Kathmandu-Hetauda In An Hour: Some Viable Alternatives," Proceedings of the First Nepal Update Seminar/Workshop Series on National Development, **Infrastructure and Development in Nepal**, August 29, 1992, Washington, D.C.

Acharya, Dharma, "Kathmandu-Hetauda Routes and Alternatives," **The Rising Nepal Friday Supplement**, October 23, 1992, Kathmandu, Nepal.

Dharma R. Acharya

Department of Civil Engineering, UMASS **Amherst, MA**
September 1983 - January 1985
Research Assistant: Reviewed and evaluated hand-held portable microcomputers for the purposes of tabulating traffic and transportation data; assisted in the analysis of efficiency and equity implication of public transit services; conducted on-board bus survey data analyses using the SPSS statistical software.

EDUCATION

Massachusetts Institute of Technology **Cambridge, MA**
Ph.D. in Transportation Systems, February 1990
Thesis Title: "Using Expert Systems and Network Optimization Techniques for Rail Relay Scheduling."

University of Massachusetts **Amherst, MA**
Master of Science in Civil Engineering with Concentration in Transportation Engineering, May 1985
Thesis Title: "An Examination of Portable Microcomputers to Collect and Summarize Turning Movement Data and to Analyze Capacity at Signalized Intersections."

Tong-ji University **Shanghai, The People's Republic of China**
Bachelor of Science in Civil Engineering with Concentration in Highway Engineering, July 1983

PUBLICATIONS AND CONFERENCE PRESENTATIONS

Acharya, Dharma, "Mathematical Programming Applications at CSX Transportation," Presented at the **17th International Symposium on Mathematical Programming**, August 7-11, 2000, Georgia Institute of Technology, Atlanta, Georgia.

Acharya, Dharma, "Preparing for the Conrail Acquisition at CSX Transportation," presented at the **Institute For Operations Research and Management Science (INFORMS)** Conference, Spring 1999, Cincinnati, Ohio.

Acharya, Dharma, "Kathmandu-Hetauda In An Hour: Some Viable Alternatives," Proceedings of the First Nepal Update Seminar/Workshop Series on National Development, **Infrastructure and Development in Nepal**, August 29, 1992, Washington, D.C.

Acharya, Dharma, "Kathmandu-Hetauda Routes and Alternatives," **The Rising Nepal Friday Supplement**, October 23, 1992, Kathmandu, Nepal.

MICHAEL R. BARANOWSKI

Mr. Baranowski is a Senior Managing Director at FTI Consulting, Inc., an economic and consulting firm with offices located at 1101 K Street, NW, Washington, D.C. 20005. Since 1980, Mr. Baranowski has been involved in various aspects of transportation analysis including operations, engineering, facility requirements, valuations, and costing. Mr. Baranowski is sponsoring portions of Sections III-F, III-G, and III-H of CSXT's Reply Evidence.
Mr. Baranowski has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Baranowski holds a Bachelor of Science degree in accounting from Fairfield University in Fairfield, Connecticut. In 1980, he joined the consulting firm of Wyer, Dick and Company in Livingston, New Jersey as a consultant. He participated in a variety of studies for railroad, shipper and other clients including line abandonments, operations analysis, terminal switching studies, labor protection and rail facility and equipment valuation.

In late 1981, Mr. Baranowski became a consultant with Snavely, King and Associates with offices in Morristown, New Jersey and Washington, D.C. While at Snavely, King, he was involved in rail merger, traffic, switching, liquidation and valuation studies for a variety of rail and rail related clients. He was also responsible for engineering, operating and costing components in a number of Section 229 proceedings.

Mr. Baranowski joined Klick, Kent & Allen ("KK&A") in 1988 as a Senior Consultant. He became a principal of KK&A in 1989 and remained in that position until its acquisition by FTI in 1998. Mr. Baranowski has presented testimony before the Interstate Commerce Commission, Surface Transportation Board, Federal Communications Commission, Federal Regulatory Commission and a variety of state regulatory agencies. Mr. Baranowski's complete curriculum vitae is attached.

VERIFICATION

I, Michael R. Baranowski, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Michael R. Baranowski

Executed on this 19 day of July 2014.

Michael R. Baranowski

Senior Managing Director – Economic Consulting

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FTI Consulting
1101 K Street, NW
Suite B100
Washington, DC 20005
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Education
B.S. in Accounting, Fairfield University

Supplemental Finance Studies, Kean College

Mike Baranowski provides financial and economic consulting services to the telecommunications and transportation industries. He has special expertise in analyzing and developing complex computer costing models, operations analysis, and transportation engineering. Much of his work involves providing oral and written expert testimony before courts and regulatory bodies.

Some of Mr. Baranowski's representative accomplishments include:

- Overseeing the development of computer cost modeling tools designed to simulate the cost of competitive entry into local telecommunications markets and directing the efforts of a nationwide team of testifying experts presenting the cost model results in multiple proceedings across the country.
- Directing the analysis, critique and restatement of a variety of complex cost models developed by major telecommunications companies designed to simulate the forward-looking cost of competitive entry into local telecommunications markets.
- Designing multiple PC-based spreadsheet models for use in calculating the stand-alone cost of competitive entry into the railroad and pipeline markets. These models have been used to assist clients in all three network industries in making internal pricing decisions that are in compliance with governing regulatory standards.
- Conducting detailed analyses of railroad operations and developing the associated capital requirements and operating expenses attributable to specific movements and the incremental capital and operating expense requirements attributable to major changes in anticipated traffic levels.
- Calculating marginal and incremental costs for a major petroleum products pipeline company, an approach that is now used regularly by the company in making internal day-to-day pricing decisions.

Mr. Baranowski holds a B.S. in Accounting from Fairfield University in Fairfield, Connecticut and has pursued supplemental finance studies at Kean College in Union, New Jersey.

TELECOMMUNICATIONS TESTIMONY

Federal Communications Commission

February 1998	File No. E-98-05. AT&T Corp. v. Bell Atlantic Corp. Affidavit of Michael R. Baranowski.
March 13, 1998	File No. E-98-05. AT&T Corp. v. Bell Atlantic Corp. Supplemental Affidavit of Michael R. Baranowski.
June 10, 1999	CC Docket No. 96-98. Implementation of the Local Competition Provisions of the Telecommunications Act of 1996. Reply Affidavit of Michael R. Baranowski, John C. Klick and Brian F. Pitkin.

July 25, 2001	CC Docket No. 00-251, 00-218. In the Matter of Petition of AT&T Communications of Virginia, Inc. and WorldCom, Inc., Pursuant to Section 252(e)(5) of the Communications Act, for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon-Virginia, Inc. Panel
June 13, 2005	WC Docket No. 05-25;RM-10593. In the Matter of Special Access Rates for Price Cap Local Exchange Carriers; AT&T Corp. Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services, Joint Declaration on Behalf of SBC Communications, Inc.
July 29, 2005	WC Docket No. 05-25;RM-10593. In the Matter of Special Access Rates for Price Cap Local Exchange Carriers; AT&T Corp. Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services, Joint Reply Declaration on Behalf of SBC Communications, Inc.

Public Service Commission of Delaware

February 4, 1997	PSC Docket No. 96-324. In the Matter of Bell Atlantic - Delaware Statement of Terms and Conditions Under Section 252(F) of the Telecommunications Act of 1996. Testimony of Michael R. Baranowski.

Public Service Commission of the District of Columbia

March 24, 1997	Formal Case No. 962. In the Matter of the Implementation of the District of Columbia Telecommunications Competition Act of 1996. Testimony of Michael R. Baranowski.
May 2, 1997	Formal Case No. 962. In the Matter of the Implementation of the District of Columbia Telecommunications Competition Act of 1996. Rebuttal Testimony of Michael R. Baranowski.

Public Service Commission of the State of Maryland

March 7, 1997	Docket No. 8731, Phase II. In the Matter of the Petitions for Approval of Agreements and Arbitration of Unresolved Issues Arising Under Section 252 of the Telecommunications Act of 1996. Direct Testimony of Michael R. Baranowski.
April 4, 1997	Docket No. 8731, Phase II. In the Matter of the Petitions for Approval of Agreements and Arbitration of Unresolved Issues Arising Under Section 252 of the Telecommunications Act of 1996. Rebuttal Testimony of Michael R. Baranowski.
May 25, 2001	Case No. 8879. In the Matter of the Investigation into Rates for Unbundled Network Elements Pursuant to the Telecommunications Act of 1996. Panel Testimony on Recurring Cost Issues

Public Service Commission of the State of Michigan

January 20, 2004	Case No. U-13531. In the Matter, on the Commission's Own Motion to Review the Costs of Telecommunication Service Provided By SBC Michigan. Initial Testimony of Michael R. Baranowski and Julie A. Murphy.
May 10, 2004	Case No. U-13531. In the Matter, on the Commission's Own Motion to Review the Costs of Telecommunication Service Provided By SBC Michigan. Final Reply Testimony of Michael R. Baranowski and Julie A. Murphy.

New Jersey Board of Public Utilities

December 20, 1996	Docket No. TX 95120631. Notice of Investigation Local Exchange Competition for Telecommunications Services. Rebuttal Testimony of John C. Klick and Michael R. Baranowski.

North Carolina Utilities Commission

March 9, 1998	Docket No. P-100, Sub 133d. In the Matter of Establishment of Universal Support Mechanisms Pursuant to Section 254 of the Telecommunications Act of 1996. Rebuttal Testimony of Michael R. Baranowski.

Pennsylvania Public Utility Commission

January 13, 1997	Docket Nos. A-310203F0002 et al. MFS-III. Application of MFS Intelenet of Pennsylvania, Inc. et. Al. (Phase III). Rebuttal Testimony of Michael R. Baranowski.
February 21, 1997	Docket Nos. A-310203F0002 et al. MFS-III. Application of MFS Intelenet of Pennsylvania, Inc. et. Al. (Phase III). Surrebuttal Testimony of Michael R. Baranowski.
April 22, 1999	Docket Nos. P-00991648, P-00991649. Petition of Senators and CLECs for Adoption of Partial Settlement and Joint Petition for Global Resolution of Telecommunications Proceedings. Direct Testimony of Michael R. Baranowski.
January 11, 2002	Docket No. R-00016683. Generic Investigation of Verizon Pennsylvania, Inc.'s Unbundled Network Element Rates. Panel Testimony on Recurring Cost Issues

State Corporation Commission Commonwealth of Virginia

April 7, 1997	Case No. PUC970005. Ex Parte to Determine Prices Bell Atlantic - Virginia, Inc. Is Authorized To Charge Competing Local Exchange Carriers In Accordance With The Telecommunications Act of 1996 And Applicable State Law. Affidavit of Michael R. Baranowski.
April 23, 1997	Case No. PUC970005. Ex Parte to Determine Prices Bell Atlantic - Virginia, Inc. Is Authorized To Charge Competing Local Exchange Carriers In Accordance With The Telecommunications Act of 1996 And Applicable State Law. Direct Testimony of Michael R. Baranowski.

June 10, 1997	Case No. PUC970005. Ex Parte to Determine Prices Bell Atlantic - Virginia, Inc. Is Authorized To Charge Competing Local Exchange Carriers In Accordance With The Telecommunications Act of 1996 And Applicable State Law. Rebuttal Testimony of Michael R. Baranowski.

Washington State Utilities and Transportation Commission

December 22, 2003	Docket No. UT-033044. In the Matter of the Petition of Qwest Corporation To Initiate a Mass-Market Switching and Dedicated Transport Case Pursuant to the Triennial Review Order. Direct Testimony of Michael R. Baranowski.
February 2, 2004	Docket No. UT-033044. In the Matter of the Petition of Qwest Corporation To Initiate a Mass-Market Switching and Dedicated Transport Case Pursuant to the Triennial Review Order. Response Testimony of Michael R. Baranowski.

Public Service Commission of West Virginia

February 13, 1997	Case Nos. 96-1516-T-PC, 96-1561-T-PC, 96-1009-T-PC, 96-1533-T-T. Petition to establish a proceeding to review the Statement of Generally Available Terms and Conditions offered by Bell Atlantic in accordance with Sections 251, 252, and 271 of the Telecommunications Act of 1996. Testimony of Michael R. Baranowski.
February 27, 1997	Case Nos. 96-1516-T-PC, 96-1561-T-PC, 96-1009-T-PC, 96-1533-T-T. Petition to establish a proceeding to review the Statement of Generally Available Terms and Conditions offered by Bell Atlantic in accordance with Sections 251, 252, and 271 of the Telecommunications Act of 1996. Rebuttal Testimony of Michael R. Baranowski.
June 3, 2002	Case No. 01-1696-T-PC, Verizon West Virginia, Inc. Petition For Declaratory Ruling That Pricing of Certain Additional Unbundled Network Elements (UNEs) Complies With Total Element Long-Run Incremental Cost (TELRIC) Principles. Direct Testimony of Michael R. Baranowski
July 1, 2002	Case No. 01-1696-T-PC, Verizon West Virginia, Inc. Petition For Declaratory Ruling That Pricing of Certain Additional Unbundled Network Elements (UNEs) Complies With Total Element Long-Run Incremental Cost (TELRIC) Principles. Supplemental Direct Testimony of Michael R. Baranowski

RAILROAD TESTIMONY

Interstate Commerce Commission

March 9, 1995	Finance Docket No. 32467. National Railroad Passenger Corporation and Consolidated Rail Corporation -- Application Under Section 402(a) of the Rail Passenger Service Act for an Order Fixing Just Compensation.
October 30, 1995	Docket No. 41185. Arizona Public Service Company and Pacificorp v. The Atchison, Topeka and Santa Fe Railway Company.

Surface Transportation Board

July 11, 1997	Docket No. 41989. Potomac Electric Power Company v. CSX Transportation, Inc. Reply Statement and Evidence of Defendant CSX Transportation, Inc.
August 14, 2000	Docket No. 42051. Wisconsin Power and Light Company v. Union Pacific Railroad Company, Reply Verified Statement of Christopher D. Kent and Michael R. Baranowski.
September 20, 2002	STB Docket No. 42070. Duke Energy Corporation v. CSX Transportation, Inc., Reply Evidence and Argument of CSX Transportation, Inc.
September 30, 2002	STB Docket No. 42069. Duke Energy Corporation v. Norfolk Southern Railway Company, Reply Evidence and Argument of Norfolk Southern Railway Company.
October 11, 2002	STB Docket No. 42072. Carolina Power & Light v. Norfolk Southern Railway Company, Reply Evidence and Argument of Norfolk Southern Railway Company.
November 12, 2002	Docket No. 42070 Duke Energy Corporation v. CSX Transportation, Rebuttal Evidence and Argument of CSX Transportation
November 19, 2002	Docket No. 42069 Duke Energy Corporation v. Norfolk Southern Railway Company, Rebuttal Evidence and Argument of Norfolk Southern Railway Company
November 27, 2002	Docket No. 42072 Carolina Power & Light Company v. Norfolk Southern Railway Company, Rebuttal Evidence and Argument of Norfolk Southern Railway Company
January 10, 2003	STB Docket No. 41185. Arizona Public Service Co. And Pacificorp v. The Atchison, Topeka and Santa Fe Railway Company, Petition of the Burlington Northern and Santa Fe Railway Company to Reopen and Vacate Rate Prescription.
February 19, 2003	STB Docket No. 42077, Arizona Public Service Co. And Pacificorp v. The Burlington Northern and Santa Fe Railway Company, and STB Docket No. 41185, Arizona Public Service Co. And Pacificorp v. The Burlington Northern and Santa Fe Railway Company, Reply of the Burlington Northern Santa Fe Railway Company in Opposition to Petition for Consolidation.
April 4, 2003	Docket No. 42057 Public Service Company of Colorado D/B/A Xcel Energy v. The Burlington Northern and Santa Fe Railway Company, Reply Evidence and Argument of The Burlington Northern and Santa Fe Railway Company
October 8, 2003	Docket No. 42071 Otter Tail Power Company v. The Burlington Northern and Santa Fe Railway Company, Reply Evidence of The Burlington Northern and Santa Fe Railway Company
October 24, 2003	Docket No. 42069 Duke Energy Corporation v. Norfolk Southern Railway Company, Supplemental Evidence of Norfolk Southern Railway Company

October 31, 2003	Docket No. 42069 Duke Energy Corporation v. Norfolk Southern Railway Company, Reply of Norfolk Southern Railway Company to Duke Energy Company's Supplemental Evidence
November 24, 2003	Docket No. 42072 Carolina Power & Light Company v. Norfolk Southern Railway Company, Supplemental Evidence of Norfolk Southern Railway Company
December 2, 2003	Docket No. 42072 Carolina Power & Light Company v. Norfolk Southern Railway Company, Reply of Norfolk Southern Railway Company to Carolina Power & Light Company's Supplemental Evidence
December 12, 2003	Docket No. 42069 Reply of Norfolk Southern Railway Company to Duke Energy Corporation's Petition to Correct Technical Error and Affidavit of Michael R. Baranowski
January 5, 2004	Docket No. 42070 Duke Energy Corporation v. CSX Transportation, Inc., Supplemental Evidence of CSX Transportation, Inc.
January 26, 2004	Docket No. 42058 Arizona Electric Power Cooperative, Inc. v. The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad Company, Joint Supplemental Reply Evidence and Argument of The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad Company
March 22, 2004	Docket No. 42071 Otter Tail Power Company v. The Burlington Northern and Santa Fe Railway Company, Supplemental Reply Evidence of The Burlington Northern and Santa Fe Railway Company
April 9, 2004	Docket No. 41185 Arizona Public Service Company and Pacificorp v. The Burlington Northern and Santa Fe Railway Company, The Burlington Northern and Santa Fe Railway Company's Reply Evidence on Reopening
May 24, 2004	Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. The Burlington Northern and Santa Fe Railway Company, Reply Evidence of The Burlington Northern and Santa Fe Railway Company
June 23, 2004	Docket No. 42057 Public Service Company of Colorado d/b/a Xcel Energy v. The Burlington Northern and Santa Fe Railway Company, Petition to Correct Technical and Computational Errors
March 1, 2005	Docket No. 42071 Otter Tail Power Company v BNSF Railway Company, Supplemental Evidence of BNSF Railway Company
April 4, 2005	Docket No. 42071 Otter Tail Power Company v BNSF Railway Company, Reply of BNSF Railway Company to Supplemental Evidence
July 20, 2005	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Reply Evidence of BNSF Railway Company
May 1, 2006	Docket No. Ex Parte 657 (Sub-No. 1) Major Issues in Rail Rate Cases, Verified Statement Supporting Comments of BNSF Railway Company

May 31, 2006	Ex Parte 657 (Sub-No. 1) Major Issues in Rail Rate Cases; Verified Statement Supporting Reply Comments of BNSF Railway Company
June 15, 2006	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Reply Supplemental Evidence of BNSF Railway Company
June 15, 2006	Docket No. 41191 (Sub 1) AEP Texas North Company v. BNSF Railway Company, Reply Supplemental Evidence of BNSF Railway Company
June 30, 2006	Docket No. Ex Parte 657 (Sub-No. 1) Major Issues in Rail Rate Cases; Verified Statement Supporting Rebuttal Comments of BNSF Railway Company
February 4, 2008	Docket No. 42099 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Opening Evidence of CSX Transportation, Inc.
February 4, 2008	Docket No. 42100 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Opening Evidence of CSX Transportation, Inc.
February 4, 2008	Docket No. 42101 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Opening Evidence of CSX Transportation, Inc.
May 1, 2008	Docket No. Ex Parte 679 Petition of the AAR to Institute a Rulemaking Proceeding to Adopt a Replacement Cost Methodology to Determine Railroad Revenue Adequacy, Verified Statement of Michael R. Baranowski
July 14, 2008	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Third Supplemental Reply Evidence of BNSF Railway Company
July 14, 2008	Docket No. AB-515 (Sub-No. 2) Central Oregon & Pacific Railroad, Inc. -- Abandonment and Discontinuance of Service -- in Coos, Douglas, and Lane Counties, Oregon (Coos Bay Rail Line)
August 8, 2008	Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. BNSF Railway Company, Fourth Supplemental Evidence of BNSF Railway Company
August 11, 2008	Docket No. 42014 Entergy Arkansas, Inc. and Entergy Services, Inc. v Union Pacific Railroad Company and Missouri & Northern Arkansas Railroad Company, Inc.; Finance Docket No. 32187 Missouri & Northern Arkansas Railroad Company, Inc. – Lease, Acquisition and Operations Exemption – Missouri Pacific Railroad Company and Burlington Northern Railroad Company, Reply Evidence and Argument of Union Pacific
September 5, 2008	Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. BNSF Railway Company, Fourth Supplemental Reply Evidence of BNSF Railway Company
September 12, 2008	Docket No. AB-515 (Sub-No. 2) Central Oregon & Pacific Railroad, Inc. -- Abandonment and Discontinuance of Service -- in Coos, Douglas, and Lane Counties, Oregon (Coos Bay Rail Line); Rebuttal to Protests
August 24, 2009	Docket No. 42114 US Magnesium, L.L.C. v. Union Pacific Railroad Company, Opening Evidence of Union Pacific Railroad Company
October 22, 2009	Docket No. 42114 US Magnesium, L.L.C. v. Union Pacific Railroad Company, Rebuttal Evidence of Union Pacific Railroad Company

January 19, 2010	Docket No. 42110 Seminole Electric Cooperative, Inc. v. CSX Transportation, Inc., Reply Evidence of CSX Transportation, Inc.
May 7, 2010	Docket No. 42113 Arizona Electric Power Cooperative, Inc. v. BNSF Railway Company and Union Pacific Railroad Company, Joint Reply Evidence of BNSF Railway Company and Union Pacific Railroad Company
November 22, 2010	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, BNSF Comments on Remand, Joint Verified Statement of Michael R. Baranowski and Benton V. Fisher
January 6, 2011	Docket No. 42056 Texas Municipal Power Agency v. BNSF Railway Company, BNSF Reply to TMPA Petition for Enforcement of Decision, Joint Verified Statement of Michael R. Baranowski and Benton V. Fisher
October 28, 2011	Docket No. FD 35506 Western Coal Traffic League - Petition for Declaratory Order, Opening Evidence of BNSF Railway Company, Joint Verified Statement of Michael R. Baranowski and Benton V. Fisher
November 10, 2011	Docket No. 42127 Intermountain Power Agency v. Union Pacific Railroad Company, Reply Evidence of Union Pacific Railroad Company\
November 28, 2011	Docket No. FD 35506 Western Coal Traffic League - Petition for Declaratory Order, Reply Evidence of BNSF Railway Company, Joint Reply Verified Statement of Michael R. Baranowski and Benton V. Fisher
May 10, 2012	Docket No. 42056 Texas Municipal Power Agency v. BNSF Railway Company, BNSF Reply to TMPA Petition to Reopen and Modify Rate Prescription, Joint Verified Statement of Michael R. Baranowski and Benton V. Fisher

US District Court for Northern District of Oklahoma

January 2, 2007	Case No. 06-CV-33 TCK-SAJ, Grand River Dam Authority v. BNSF Railway Company; Report of Michael R. Baranowski
February 2, 2007	Case No. 06-CV-33 TCK-SAJ, Grand River Dam Authority v. BNSF Railway Company; Reply Report of Michael R. Baranowski

Circuit Court of Pulaski County, Arkansas

August 17, 2007	Case No. CV 2006-2711, Union Pacific Railroad v. Entergy Arkansas, Inc. and Entergy Services, Inc., Expert Witness Report of Michael R. Baranowski
December 14, 2007	Case No. CV 2006-2711, Union Pacific Railroad v. Entergy Arkansas, Inc. and Entergy Services, Inc., Reply Expert Witness Report of Michael R. Baranowski

U.S. District Court for the Eastern District of Wisconsin

February 15, 2008	Case No. 06-C-0515, Wisconsin Electric Power Company v. Union Pacific Railroad Company, Expert Reply Report of Michael R. Baranowski

Arbitrations and Mediations

March 7, 2005	Arbitration Case #181 Y 00490 04 BNSF Railway Company and J.B. Hunt Transport, Inc., Expert Report on behalf of BNSF Railway Company
March 28, 2005	Arbitration Case #181 Y 00490 04 BNSF Railway Company and J.B. Hunt Transport, Inc., Rebuttal Expert Report on behalf of BNSF Railway Company
April 12, 2005	Arbitration Case #181 Y 00490 04 BNSF Railway Company and J.B. Hunt Transport, Inc., Supplemental Expert Report on behalf of BNSF Railway Company
April 19, 2005	Arbitration Case #181 Y 00490 04 BNSF Railway Company and J.B. Hunt Transport, Inc., Supplemental Rebuttal Expert Report on behalf of BNSF Railway Company
April/May 2005	Arbitration Case #181 Y 00490 04 BNSF Railway Company and J.B. Hunt Transport, Inc., Hearings before Arbitration Panel
February 20, 2007	In the Matter of the Arbitration between the Detroit Edison Company, et al, and BNSF Railway Company, Expert Report of Michael R. Baranowski
March 19, 2007	In the Matter of the Arbitration between the Detroit Edison Company, et al, and BNSF Railway Company, Supplemental Expert Report of Michael R. Baranowski
February 12, 2009	In the Matter of the Arbitration between Wisconsin Public Service Corporation and Union Pacific Railroad Company, Rebuttal Expert Report of Michael R. Baranowski
October 16, 2009	In the Matter of Arbitration Between Norfolk Southern Railway Company and Drummond Coal Sales, Inc., Expert Report of Michael R. Baranowski
July 25, 2011	American Arbitration Association Case No. 58 147 Y 0031809, BNSF Railway Company and Kansas City Southern Railway Company, Expert Report of Michael R. Baranowski

PAUL E. BOBBY

Mr. Bobby is a Project Manager with STV Inc., a professional firm offering engineering, architectural, planning, environment and construction management services located at 200 West Monroe Street, Suite 1650, Chicago, Illinois 60606. Mr. Bobby is sponsoring portions of Section III-F of CSXT's Reply Evidence related to Earthwork. Mr. Bobby has signed a verification of the truth of the statements contained therein. A copy of the verification is attached hereto.

Mr. Bobby earned his Bachelor of Science degree in civil engineering from the University of Wisconsin/Platteville. He has experience in the design and construction of railroad improvements including rail clearance and grade separation programs. Mr. Bobby has participated in the design of roadway and track alignment, geometry, and right-of-way and utility conflict identification, working on feasibility studies, cost estimation and the development of staging plans for construction. Mr. Bobby's specific projects have included work on a railroad bridge for CSXT over the Hudson River, a railroad bridge for the Wisconsin Central Railroad over a roadway, and planning and design for the reconfiguration of a CSXT coal terminal in Baltimore, among several others.

Mr. Bobby is a member of the American Railway Engineering and Maintenance-of-Way Association ("AREMA"). He is also a member of the Maintenance-of-Way Club of Chicago.

Mr. Bobby's complete curriculum vitae is attached.

VERIFICATION

I, Paul E. Bobby, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Paul E. Bobby

Executed on this ___ day of July 2014.

Paul E. Bobby, P.E.

Project Manager

Mr. Bobby is a civil engineer and project manager with more than 10 years of experience in the design and construction of railroad and highway improvements, including FTA New Starts projects and rail clearance and grade separation programs. He is adept at the design of roadway and track alignment, geometry, and right-of-way (ROW) and utility conflict identification. Mr. Bobby has experience with feasibility studies, cost estimating, and the development of construction staging plans to maintain traffic and operations. He has also managed a variety of successful track capacity expansion and rail improvement project, for Metra, freight railroads, and as part of the Chicago Region Environmental and Transportation Efficiency Program (CREATE) program, which was established to identify key bottlenecks and conflicts within existing Chicagoland transportation infrastructure.

[cost estimating focus]
Mr. Bobby is a professional engineer with more than 10 years of experience providing capital cost estimating for transit and civil works projects, including FTA New Starts investments. He also brings experience in the design and construction of railroad and highway improvements, including rail clearance and grade separation programs. He served as the civil task manager for the Chicago Transit Authority (CTA) Circle Line Alternatives Analysis, and he led the Phase I engineering design for a commuter rail system for the Northern Indiana Commuter Transit District (NICTD). Mr. Bobby has experience with alignment development and analysis, right-of-way (ROW) and utility conflict identification, alternatives development and plan analyses, and feasibility studies. He also served as the project manager for a blanket contract with Metra to assist in standardizing capital cost methodology and estimates per FTA guidelines.

[track management focus]
Mr. Bobby is a project manager and track designer with more than 10 years of experience in the design and construction of rail improvements. He began his career as a track laborer for the Wisconsin Central Ltd. (now Canadian National Railway Company), and has since earned a solid reputation within the rail industry for his knowledge of light rail, passenger, and freight rail design programs. He served as lead rail engineer for the $120 million Chicago Transit Authority (CTA) Block 37 Station and Tunnel Connector, for which he provided design of a 2-track connection between the Blue and Red transit lines. He has also served as lead rail engineer for several capacity improvement projects, including work for CSX Corporation, Norfolk Southern Railway, and Kansas City Southern. In addition, Mr. Bobby has provided project management

Office Location
Chicago, IL

Date joined firm
8/23/04

Years with other firms
5

Education
Bachelor of Science, Civil Engineering; University of Wisconsin/Platteville (2000)

Professional Registrations
Professional Engineer: Georgia (2009/#PE034469/exp. 12/31/2012), Illinois (2005/Civil/Sanitary Engineering/#062-058268/exp. 11/30/13), Indiana (2007/#PE10708276/exp. 7/31/2012), and Wisconsin (2006/#38452-6/exp. 7/31/14)

Memberships
American Railway Engineering and Maintenance-of-Way Association (AREMA)

Maintenance-of-Way Club of Chicago

for blanket civil/structural and project administration contracts with Metra, including more than 20 assigned tasks, all completed within budget and on schedule.

Project Experience

BRIDGES

IDOT IL 15 over ICG Railroad and IL 13 Reconstruction - Rail Coordinator
Providing railroad coordination services for the $14.4 million replacement of dual structures on IL 15 that span IL 13 and the Illinois Central Gulf (ICG) railroad ROW in St. Clair County, IL. An Illinois Department of Transportation (IDOT) inspection found the dual bridges to be in poor condition. The agency therefore recommended that both structures be replaced. STV provided Phase I and Phase II design engineering services for the structural replacements. Phase I services included the preparation of a crash analysis, geometric studies, environmental coordination, public involvement, and all other work necessary to prepare a Project Report for design approval. Phase II includes the complete design of the new structures. Mr. Bobby communicates closely with the various rail agencies to keep them informed of the project plans and mitigate potential impacts the project may have on their operations. (11/08 - Present)

CSX Bridge 45 - Rail Engineer
Responsible for the rail alignment design and construction staging plans for a new single-track railroad bridge over the Hudson River in Iona, NY. Mr. Bobby prepared staging plans to maintain rail operations during the bridge construction. The bridge was designed with environmental sensitivity to the Hudson River ecosystem. (3/07 - 9/07)

WisDOT Wisconsin Central Railroad Bridge over US 41 - Project Manager
Managed the replacement of the Wisconsin Central Bridge US 41 in Fond du Lac, WI. Mr. Bobby prepared the project work plan, budget, amendments, and schedule; made staff assignments; quality assurance; and managed all coordination with the client. The project encompassed five alternative studies for the new structure, which replaced the existing single-track bridge. The Wisconsin Department of Transportation (WisDOT) and STV determined that two new bridges would best replace the single-track bridge over US 41. The design provided a new industrial spur railroad track off of the main line to the Fond du Lac Southwest Industrial Park. The firm also assisted in executing public information meetings and utilities coordination. Mr. Bobby's responsibilities included coordinating the evaluation of alternatives with WisDOT. (2002 - 2004)

HIGHWAYS/ROADWAYS

IDOT Elgin O'Hare West Bypass - Railroad Coordinator
Responsible for rail coordination with the Union Pacific, Canadian Pacific, and the Canadian National freight railroads, as well as the project team, for the proposed extension of the Elgin O'Hare West Bypass in Cook County, IL. This $3.6 billion project began with an Environmental Impact Statement and feasibility study analyzing alternatives to improve transportation and ease congestion within the study area. Proposed improvements include widening existing roadways and extending the Elgin O'Hare Expressway east into O'Hare International Airport to provide western airport access. The initial study was completed and presented to the Illinois Department of Transportation (IDOT), who is moving forward

with the design of the recommended improvements that have the least impact on the surrounding neighborhoods. Mr. Bobby is overseeing the evaluation of the impacts of the proposed Elgin O'Hare West Bypass on the freight and passenger rail services located within the project area. The primary objectives of his coordination efforts are to keep the railroads informed of the progress of the study and to resolve any potential conflicts at an early stage. Mr. Bobby also has been working with the planning team during the alternative design process and advising them of potential rail impacts. (9/07 - Present)

ISTHA Open Road Tolling Plaza CM - Project Controls
Provided project controls for STV's Phase III engineering services for plaza/roadway improvements for the open road tolling conversions at four mainline plazas on the Tri-State Tollway for the Illinois State Toll Highway Authority (ISTHA). The conversions included the Tri-State Tollway; M.P. 19.5 (83rd Street- Plaza 39); M.P. 19.8 (82nd Street - Plaza 36); M.P. 30 (Cermak - Plaza 35); and M.P. 39 (Irving Park- Plaza 33) in DuPage and Lake Counties in Illinois. Mr. Bobby assisted in cost analysis, construction revisions, quantity changes, and change order requests. (2005 - 2006)

IDOT Dan Ryan Expressway Reconstruction - Project Engineer
Provided interdisciplinary coordination, road grading, and intersection grading design of the frontage road reconstruction from 63rd Street to 47th Street on the Dan Ryan Expressway in Chicago for the Illinois Department of Transportation (IDOT). Mr. Bobby's responsibilities included ramp relocations, writing special provisions, and horizontal and vertical design layout. He also designed 25 cast-in-place retaining walls, which line the frontage roads and ramps. (2/03 - 4/04)

Village of Elwood Drummond Road Relocation - Project Engineer
Completed horizontal and vertical design, earthwork, storm sewer layout, and erosion control for the roadway design for the relocation of Drummond Road in Elwood, IL. (11/02 - 4/03)

RAIL

CSX Curtis Bay Coal Terminal Reconfiguration - Project Manager
Managing the planning and design for the reconfiguration of CSX's Curtis Bay coal terminal in Baltimore. The project will consolidate yard tracks from the existing coal inbound yard and merchandise yard to provide three 130-foot inbound tracks to store unit coal trains. The project will also reconfigure the inbound lead tracks to the west yard in order to separate switching operations and implement new crossover arrangements at the existing three coal dumpers. The work is needed for CSX's planned expansion of ground storage at this facility. Mr. Bobby is overseeing the conceptual layouts and design for the yard reconfiguration. The most challenging aspect is staging the sequence of construction for the maintenance of operations to minimize impacts to CSX service during construction. He is also conducting onsite visits, communicating extensively with the client, and managing the project budget and schedule. (11/11 - Present)

UP CREATE B-2 Project - Project Manager
Oversaw design engineering services for the reconstruction of the Metra's Union Pacific West Line's passenger stations in Berkeley and Bellwood, IL, as part of the CREATE B2 Project. STV provided engineering and architectural design services to modify the stations to accommodate a third mainline track being constructed by Union Pacific Railroad (UP). The station upgrades consist of new center platforms, warming shelters, and pedestrian underpasses with retaining walls. Mr. Bobby worked closely with the railroads to develop a phased implementation plan to coordinate with the third-track construction. STV completed the design in July 2011, and the project has now moved into the construction phase. Mr. Bobby is overseeing STV's construction phase services. (3/11 - Present)

CSX/Chicago/Gary Regional Airport Authority CSX Fort Wayne Line and NS Gary Branch Consolidation - Project Manager

Overseeing track and civil plans for the consolidation of CSX's Fort Wayne Line and the Norfolk Southern Railway (NS) Gary Branch in Gary, IN. The work is being performed to facilitate the Chicago/Gary Regional Airport Authority's airport runway extension and includes the addition of a new connection from CSX's Barr Subdivision to Canadian National (CN)'s reconfigured Elgin, Joliet & Eastern (EJ&E) Railway Line. A new industrial connection from the CSX Porter Subdivision to the Indiana Sugars manufacturing facility will also be required. In addition, the project includes reconfiguring the Clarke Junction Interlocking between the Barr Subdivision, adding a new connection to the NS Chicago Line, and removing the Pine Junction Interlocking on the Barr Subdivision to improve speeds from 40 mph to 60 mph. Mr. Bobby is coordinating closely with the client while developing the track design. STV is acting as the owner's representative for the project, and Mr. Bobby is reviewing documentation from the airport to the client to assess impacts to CSX. He is identifying potential hazards, such as drainage issues, to make sure the interests of CSX are maintained and their property is not affected during construction. Mr. Bobby is also managing the project budget, schedule, and staff. (2/11 - Present)

GEC Services for CSX CREATE Projects - Project Manager

Overseeing various projects under a general engineering consultant (GEC) contract with CSX. The aim of the Chicago Region Environmental and Transportation Efficiency (CREATE) program is to help CSX expedite freight rail transit through Chicago, the busiest rail freight gateway in the United States. The tasks under the contract involve interlocking, track, and signal modifications, which require civil and track engineering design and construction management services. (4/10 - Present)

CSX CREATE B-9 - Project Manager

Leading the design of a new double-track connection and crossover upgrades in Summit Argo, IL. The project will replace the connection between Canadian National and Baltimore & Ohio Chicago Terminal (B&OCT) tracks and increase the track capacity by extending the B&OCT siding track in Bridgeview, IL. Mr. Bobby is also overseeing improvements to Argo Yard, including realigning switch lead tracks, installing three new yard tracks, and constructing a new industry lead track to avoid switching within the control point. He is developing project reports and plans, specifications, and estimates packages for the client and contractor. Mr. Bobby is also communicating with the railroad to make sure the designs effectively meet their needs while avoiding service disruptions. (5/11 - Present)

CSX CREATE B-16 Thornton Junction Connection Design - Project Manager

Developing a project report and design approval documents for a new track and associated switches to connect the Canadian National Elsdon Sub and Union Pacific Villa Grove Sub in South Holland, IL, as part of a general engineering consultant contract for CSX. This will reestablish a former connection between the Beltway and Western Avenue corridors. (10/10 - Present)

CSX CREATE WA-2 Segment B - Project Manager

Oversaw the design of new crossovers between the Baltimore & Ohio Chicago Terminal (B&OCT) main tracks and modifications to the crossover between the B&OCT track and Norfolk Southern Railway tracks as part of a general engineering consultant contract with CSX for projects within the CREATE program. Mr. Bobby worked closely with the various railroads involved to design new alignments and profiles within the project area. He also developed a project report and plans, specifications, and estimates packages for the contractor and the railroad. (4/11 - 12/11)

CSX CREATE WA-2 Construction Management - Project Manager
Oversaw STV's construction management services during the 4-phase signal installation and construction of interlocking improvements at seven locations on the Western Avenue Corridor in Chicago, from Ogden Junction to 75th Street, where a new centralized traffic control (CTC) signaling system will be installed. The CTC signaling and interlocking improvements will increase train speeds and traffic capacity through better track utilization. The project was part of a general engineering consultant contract with CSX. (6/10 - 7/11)

CSX CREATE B12 Third Main Construction Oversight - Project Manager
Oversaw the construction of a third mainline along the Beltway Corridor from 123rd Street to CP San Francisco in Alsip and Blue Island, IL. This additional mainline will increase freight rail capacity and decrease travel times within the area. STV managed construction of new track, track upgrades, signal work, and a new rail bridge over 127th Street under a general engineering consultant contract with CSX. (4/10 - 8/11)

CHSRA Los Angeles-to-Anaheim Project EIR/EIS - QA/QC Review
Conducting a quality assurance/quality control (QA/QC) review, including track and alignments, of a 30-mile segment of high-speed rail line between Los Angeles and Anaheim, CA, for the California High-Speed Rail Authority (CHSRA). The proposed corridor runs adjacent to existing passenger and freight lines and will travel at speeds up to 220 miles per hour. The segment requires the development of solutions for overlaying a new set of track infrastructure into a physically constrained rail corridor, which includes local and regional passenger service as well as local and transcontinental rail freight operating on a limited ROW in a dense urban environment. Mr. Bobby is providing a QA/QC review of the plan and profile drawings, as well as the inclusion of alternatives for at-grade, tunnel, and aerial portions during the evaluation process. (12/09 - Present)

Sunoco Logistics Nederland Rail Facilities Upgrade - Rail Design Lead
Led the design of the rail component of the infrastructure upgrade at the large marine terminal in Nederland, TX, which provides oil loading and unloading facilities for extracting crude oil from rail cars. The site has two short existing tracks with a small number of equipment spots for loading and unloading oil. Mr. Bobby directed the design of the track extension to accommodate multiple 30-car loading and unloading spots. His team's rail plan included typical sections, alignment plan, profiles, cross sections, and track details. The track expansion was designed to be constructed under traffic to allow oil cars to still load and unload while the track extensions are constructed. (3/12 - 4/12)

NICTD Kensington Interlocking Improvements CM Services - Construction Manager
Directed construction management (CM) services for improvements at the Kensington Interlocking on Chicago's south side, including the addition of a second Northern Indiana Commuter Transportation District (NICTD) route across the Canadian National railroad to the Metra Electric Mains. STV provided a precondition survey to identify existing conditions of the rail and ROW within the project limits, including the existing signal system, structures, and track appurtenances, and oversaw all aspects of the contractor's construction methods. Mr. Bobby was responsible for field inspections, contract administration, project controls, quality assurance, safety monitoring, and procurement assistance. (12/08 - 12/11)

CSX CREATE WA-10 - Project Manager
Managed the final design of a rail interlocking to allow the interchange between the Canadian National and CSX railroads in Blue Island, IL. Expanding this interlocking between these two main lines will increase rail traffic capacity and improve train movement through Chicago. Mr. Bobby coordinated work between the signal designers and each railroad and their respective labor forces. He also prepared plans, specifications, and estimate submittals to the Illinois Department of Transportation. (6/08 - 3/11)

Metra Civil/Structural Blanket Engineering Services - Project Manager
Oversaw rail engineering services for STV's civil/structural blanket project for Metra, for which the firm provided systemwide services on an as-needed basis. STV's project scope varied by task order, and services included field verification of conditions, design of buildings and trackwork, rehabilitation of buildings and retaining walls, construction inspection and plan preparation, environmental assessments, traffic studies, roadway geometry, and property surveys. Mr. Bobby oversaw all 12 tasks associated with this contract, one of which involved conducting a thorough condition inspection, preparing a condition report, and developing the necessary rehabilitation activities for repair of the Rock Island District Turntable in Blue Island, IL. (10/08 - 12/10)

NICTD West Lake Corridor New Starts Studies - Engineering Task Leader
Led Phase I engineering design of a commuter rail system for the Northern Indiana Commuter Transit District (NICTD) extending from Valparaiso to Lowell, IN, to Chicago. Mr. Bobby prepared travel-demand modeling, alternatives development, plan and profile development, and a public outreach campaign. (7/05 - 9/10)

St. Louis Metro East Riverfront Interlocking - Project Engineer
Oversaw the track design for a new diamond interlocking located between St. Louis Metro's existing East Riverfront light-rail station and the Eads Bridge spanning the Mississippi River. The Eads Bridge is a 2-level structure carrying two sets of tracks for the MetroRail transit system on its lower level and a 4-lane highway on the upper level. The new interlocking is located in an area east of the bridge known as the East Arcade. Mr. Bobby and his team designed the new interlocking on a tight schedule and within a restricted area, which made design work challenging. The project required the installation of an asymmetrical double crossover using a combination of No. 6 and No. 8 turnouts on concrete ties to allow single-track operation over the Eads Bridge with minimal disruption to the passenger rail service while the bridge is rehabilitated. This project had an aggressive completion schedule, which required STV to develop an independent material procurement package in advance of the construction contract. Mr. Bobby directed the track design for the new interlocking and reviewed the final plans, successfully meeting the aggressive schedule. (11/09 - 6/10)

Metra Computerized Maintenance Management System Program - Project Manager
Oversaw the selection and implementation of a computerized maintenance management system (CMMS) for Metra's fixed facilities, including passenger train stations, locomotive and car shops, maintenance-of-way facilities, train control centers, and offices throughout Chicago and its surrounding suburbs. Mr. Bobby and his team collaborated with the agency to develop and implement a 2-phase plan to standardize and automate preventive maintenance work orders for Metra's fixed assets. As part of the project, STV evaluated and customized an off-the-shelf Web-based CMMS application that would replace Metra's paper-based legacy system. Mr. Bobby led site inventories to survey and document Metra's facilities equipment and assets, which were then loaded into the CMMS asset database. During the second phase of

the plan, he successfully managed the staggered implementation of the CMMS. Under Mr. Bobby's direction, the CMMS was fully implemented and is utilized across all of Metra's districts. (11/07 - 11/09)

Metra Blanket Project Administration/Management Services - Project Manager
Oversaw the administration of projects for Metra to be designed by outside consultants. Mr. Bobby managed project controls and monitored compliance with approved budgets and schedules. Specific tasks under this blanket included administration and management of parking lot design, construction inspection services, and Standard Cost Category Analysis for New Starts projects. Mr. Bobby was also responsible for making sure Metra's standards and guidelines were adhered to by the project teams and documented according to Metra project management guidelines. (2005 - 6/09)

Metra Standard Cost Category Analysis for New Starts Projects - Project Manager
Managed this project to assist Metra in standardizing the capital cost methodology and estimates for four Chicagoland projects according to FTA guidelines on Standard Cost Categories. These guidelines were required as part of the application process to enter the New Starts program for federal funding. Projects included new service to the STAR Line and Southeast Line; the Union Pacific Railroad (UP) Northwest Line track and signal improvement, as well as extension of service; and the UP West Line track and signal improvements. (12/05 - 5/07)

NS Lakeside Dam Rehabilitation - Rail Engineer
Provided design services for rail alignment and related earthwork as part of the construction of a 1.5-mile realignment in Macon, GA, for the Norfolk Southern Railway (NS). The proposed alignment was partially over a 60-foot-high earthen dam. The project, which required coordination among many stakeholders, involved a complex intersection of the railroad, a major state route, and the dam. (8/08 - 12/08)

CTA Brown Line Tie Renewal - Project Rail/Civil Engineer
Provided engineering and track inspection services for this $18 million project, which included the renewal of dense, composite ties with Pandrol plates, as well as the replacement of timber guards, rail greasers, and contact rail chairs for the Chicago Transit Authority (CTA) Brown Line in Chicago. This project included the complete replacement of timber cross ties and outer guard with plastic composite cross ties and outer guards, all new tie plates, and other track materials. Live train testing was performed on the 50-foot-high elevated track, which spans 3 miles and encompasses eight stations. Mr. Bobby assisted with constructability reviews, project planning, inspection services, and emergency services. (4/08 - 9/08)

CSX Goldsboro Passing Siding - Lead Rail Engineer
Oversaw rail engineering for the design of a 2-mile passing siding on the W&W subdivision of the Atlantic Coast Line in Goldsboro, NC. Work for this project was performed on an accelerated schedule, allowing only four weeks from the start of engineering until the bid documents needed to be complete. Mr. Bobby prepared complete documents, including plans, special provisions, and cost estimates. The project was completed on time and within budget. (6/07)

KCS Meridian Rail Siding - Lead Rail Engineer
Led the design team for a proposed rail alignment and related earthwork as part of the construction of a 3-mile double-track extension on the Meridian Speedway in Meridian, MS. The project had an aggressive schedule, and the line remained operational with staged construction. The project was part of a master agreement with Kansas City Southern (KCS) to provide professional services on an on-call basis for the main rail lines. (3/07 - 5/07)

KCS Meridian Connection - Lead Rail Engineer
Served as technical lead and managed the design team responsible for the design of the rail alignment and related earthwork as part of the construction of a 4-mile realignment and connection of the Norfolk Southern Railway (NS) and the Kansas City Southern (KCS) railway on the Meridian Speedway in Meridian, MS. The project required extensive coordination between the KCS and NS railroads, resulting in an operational staging plan suitable for both parties. The project was part of a master agreement with KCS to provide professional services on an on-call basis for the main rail lines. (3/07 - 5/07)

NS Heartland Clearance Improvements CM - Rail Engineer
Provided design services in support of construction management (CM) for modifications to the Norfolk Southern Railway (NS) alignment in order to meet clearance requirements and developed an undercutting plan to be executed by the railroad for clearance improvements to 29 tunnels in Virginia, West Virginia, Kentucky, and Ohio known as the "Heartland Corridor." Mr. Bobby contributed to the design of overhead bridge-jacking plans to obtain vertical clearances. He modified slide fences, provided utility coordination, and reviewed track design. Mr. Bobby also created railroad bridge-lowering plans and stormwater pollution prevention plans at tunnel portals for this $191 million project. (7/06 - 8/06)

Michigan State University Rail Feasibility Study - Rail Advisor
Provided technical advisement to Michigan State University (MSU) for a feasibility study to expand its existing coal storage yard to allow for bulk unit trains. The study investigated the possibility of increasing both operational flexibility and capacity to allow MSU to store unit trains and perform switching operations. Mr. Bobby utilized his extensive rail experience to advise the client on geometric and operational solutions, and performed quality assurance for the study. (11/05 - 2/06)

CTA Circle Line Alternatives Analysis - Task Manager
Served as civil task manager for the alternatives analysis of the new Chicago Transit Authority (CTA) Circle Line, which would connect the existing CTA transit lines and several Metra commuter lines by an outer loop track approximately two miles outside of downtown Chicago. Mr. Bobby performed project data collection, horizontal/vertical alignment development and analysis, and ROW and utility-conflict identification. The study focused on a series of elevated structures and underground tunnels required to make the connections. (4/04 - 8/04)

Metra Southwest Service Expansion - Project Engineer
Led the rail design for this $97 million mainline expansion of Metra's Southwest Service Line in Chicago, a Federal Transit Administration New Starts project to support Metra's growing ridership needs. The scope of work included upgrading 3.2 miles of an existing single-track to a double-track to increase the frequency of Metra's service to its existing areas and expand service to Manhattan, IL. The project also included four maintenance-of-way sidings, three interlockings, two new station layouts, and one new yard that included a maintenance facility. Mr. Bobby coordinated with the various project disciplines to develop the rail design according to the project plan. He also produced bid documents. (3/01 - 11/02)

City of Ottawa Illinois Valley Commuter Rail Feasibility Study - Project Engineer
Provided conceptual engineering for the analysis of the physical, operational, and financial feasibility of providing commuter rail service on an existing active railroad ROW and trackage between Joliet and LaSalle/Peru, IL. (4/02)

SITE DEVELOPMENT

Forest City Enterprises Illinois Science and Technology Park Redevelopment - Project Manager
Oversaw the development of the master utility and drainage plan and the Phase I construction documents for this $500 million, 23-acre redevelopment project in Skokie, IL. The scope of work included the demolition of multiple buildings, site utilities disconnection and demolition, partial utility tunnel demolition, site backfill, and temporary site and landscape improvements in preparation for new buildings, structures, and permanent landscape. Mr. Bobby managed the pre-design services, the development of site utility and drainage master plans, and limited interim site engineering for a master plan, all of which addressed current and future buildings, as well as phased development. He oversaw the integration of existing systems with new systems, and attended meetings with the client, utility companies, surveyors, public agencies, construction and demolition contractors, architects, and electrical/mechanical consultants. (2005 - 2007)

TRANSPORTATION FACILITIES

City of Joliet Regional Multimodal Transportation Center - Engineering Lead
Provided railroad coordination and oversaw required infrastructure improvements as part of the development of a multimodal transportation center in Joliet, IL. Several modes of transportation will be relocated into a central facility located within the Joliet Union Depot Interlocking, which includes Union Pacific Railroad, BNSF Railway, Amtrak, and the Metra Rock Island District and Heritage Corridor rail lines, and will connect to the historic Joliet Union Station. Mr. Bobby coordinated with the various rail agencies, keeping them informed of the project plans and mitigating potential impacts the project may have on the railroads. STV provided professional services for the planning and engineering of the center and developed an implementation plan identifying possible funding sources and phasing of project elements over a multi-year timeframe. In addition to rail coordination, Mr. Bobby developed infrastructure improvements related to track realignments, platform configurations, interlocking modifications, bridge rehabilitations, and construction staging for the estimated $42 million facility. (9/09 - 2/11)

Riverview Trenton Rail Road Intermodal Facility - Design Engineer
Prepared plans for conceptual grade crossings, new yard layout, container storage, and trackwork for this intermodal facility in Detroit. (6/01)

Amtrak Detroit Station - Design Engineer
Designed a parking lot, site drainage, and grading plans for the development of this rail station in Detroit. Mr. Bobby was also responsible for utility and rail coordination. (1/01 - 6/01)

City of Lisle Commuter Rail Station - Resident Engineer
Completed inspection, material testing, and construction documentation for a commuter rail station rehabilitation in Lisle, IL. The project included construction of new precast platforms on grade beams, handicap ramps, hand railings, drainage, retaining walls, and stairways. (6/01)

Jefferson Terminal Railroad Auto Mixing Facility - Design Engineer
Provided the conceptual design of an auto mixing facility in Detroit, MI, which incorporated over-the-road auto haulers with a rail yard and staging facility that included plans for conceptual grade crossings, new yard layout, container storage, and trackwork. (5/01)

CSX Piqua Yard - Design Engineer
Provided cost-estimating and design services for a new yard located in Fort Wayne, IN, to accommodate a new steel manufacturer in the area that needed rail service. (6/00 - 12/00)

Metra 47th Street Trainwasher - Project Engineer
Provided on-site project-engineering services during construction for the layout of the yard lead track and new approach to the trainwasher. (5/00 - 7/00)

MWRDGC Stickney Facility Centrifuge - Track Engineer
Designed the layout for additional yard track for the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) centrifuge in Stickney, IL. Mr. Bobby also incorporated a new car-mover with the existing facility. (5/98 - 8/98)

TUNNELS

CTA Block 37 Station and Tunnel Connector - Project Engineer/Lead Rail Engineer
Designed the rail alignment for a mined tunnel in water-bearing soft clay that connects the Chicago Transit Authority (CTA) Blue and Red transit lines in Chicago. Located at Block 37 between State and Dearborn streets, this tunnel links the two subways to a new underground station. Work for this project was performed on an extremely complex and tight schedule, and had to be completed with minimal disruptions to the subway service. Mr. Bobby prepared all special trackwork and details, and established the horizontal geometry for the trackwork and alignment for the entire project. (8/04 - 6/07)

WATER RESOURCES

MWRDGC MUPPS for the North Side Water Reclamation Plant - Project Engineer
Provided overall engineering services to prepare a Master Underground Process Piping Survey (MUPPS) — a comprehensive Geographical Interface System (GIS) database that identifies and locates all underground utilities, process piping, topographic features, and permanent structures — at the North Side Water Reclamation in Skokie, IL, for the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC). The GIS system comprises AutoCAD Civil Map 3-D graphical objects with links to a customized Microsoft Access relational database, and facilitates an inventory and information retrieval on all site utilities. Mr. Bobby was responsible for the development and implementation of the GIS database system and researched and digitized existing district drawings and associated databases. (7/07 - 5/09)

Publications and Presentations

Published and presented "Metra - Southwest Service Expansion" at the American Railway Engineering and Maintenance-of-Way Association (AREMA) International Conference in Chicago. (2003)

GARY BONNEAU

Mr. Bonneau is a Communications and Security Project Manager/Systems Integration Manager with STV Inc., a professional firm offering engineering, architectural, planning, environmental, and construction management services with offices at 5200 Belfort Road, Suite 400, Jacksonville, Florida 32256. Mr. Bonneau has over 25 years of experience in project management with an expertise in engineering and systems integration of communications and control systems. Mr. Bonneau is sponsoring portions of Section III-F of CSXT's Reply Evidence relating to Signals and Communications. Mr. Bonneau has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Bonneau has worked on communications systems and related issues for rail projects across the country and around the world. His projects have included rail control centers for the Rotterdam Metro and the Seattle Sound Transit Yard. Mr. Bonneau oversaw the design and installation of an Automatic Train Supervision system in New York City and has been involved in other rail communications projects in Washington state, New York, Albania, and other locations around the world.

Mr. Bonneau's complete curriculum vitae is attached.

VERIFICATION

I, Gary R. Bonneau, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Gary R. Bonneau

Executed on this 16 day of July 2014.

Gary R. Bonneau

Communications and Security Project Manager/Systems Integration Manager

Mr. Bonneau has more than 25 years of experience in project management with expertise in engineering and systems integration of communications and control systems for transportation agencies. He has overseen design, installation, configuration, and commissioning of fiber and copper backbone, network management, supervisory control and data acquisition (SCADA), telephone, CCTV, fire, intrusion, central control, voice and data radio, signal, and public address (PA)/variable message sign systems for numerous light rail transit (LRT) and subway systems. Mr. Bonneau has also performed the hands-on daily management of installation and commissioning of these systems.

Employee No.
10084

Department No.
136

Office Location
Orlando, FL

Date joined firm
12/2/13

Years with other firms
28

Education
Associate of Arts, Foundations of Business; University of Phoenix (2011)

Certifications
Contractor's License (Oregon)

Project Experience

INDUSTRIAL/MANUFACTURING

GE Transportation Systems - Project Validation Subsection Manager
Managed a team of 23 global field and office employees working domestically and internationally, including project engineers and technicians. Mr. Bonneau coordinated closely with program managers, system engineers, Center of Excellence engineers, and cross-functional teams to drive the execution of engineering development activities and take overall responsibility for directing the completion of engineering development within budget and on schedule. He was responsible for testing and validating integrated systems for intelligent control systems, including signaling, communications, substations, traction power systems, earth and bonding, SCADA, and operational control center. Mr. Bonneau was also responsible for the resolution of critical technical interface issues and interactions between the systems and construction activities. (4/12 - 10/13)

Navigator Dispatch Software Products - Product/Systems Integration Manager
Provided management and technical interface leadership through a hands-on approach to provide rail customers with state-of-the-art control center operations systems. Mr. Bonneau managed the software production; and design, installation, and commissioning of engineering and inspection of the control center system. His projects included the Rotterdam Metro, and the Seattle Sound Transit yard. (2010 - 2012)

GE Transportation Systems - Subsection Manager Integrated Solutions and Network Projects
Provided field engineering and management leadership for domestic and international control center projects. Mr. Bonneau oversaw the schedule,

budget, and overall project management and engineering for six rail control center systems. He was responsible for field management, enhanced engineering, custom software development, and project closeout. Mr. Bonneau created annual business plans and quarterly financial plans, and he developed and implemented growth strategies, and project performance effectiveness programs. (9/10 - 4/12)

GE Transportation Systems - Engineering Manager Special Projects
Responsible for resource and field management, budget tracking, integration engineering, custom software development, and closeout of critical projects. Mr. Bonneau oversaw the handoff of integrated systems from systems engineering to field installation and commissioning. He also produced and reviewed installation and in-service documentation of verified factory test results, and produced field validation procedures. Mr. Bonneau supervised nearly 40 systems engineers and technicians, identified field problems, collaborated with engineers to develop solutions, and provided customer service and support. He also created annual business plans, quarterly financial reports, and project performance effectiveness programs. (9/08 - 9/10)

GE Transportation Systems - Projects Leader
Provided leadership and executive management of West Coast project managers. Mr. Bonneau oversaw project management, design, engineering, installation, and commissioning of the $40 million Sound Transit Central Link LRT communications system. He supervised a staff of 22 and trained and developed engineers and technicians on state-of-the-art communications technology. (1/05 - 9/08)

GE Transportation Systems - Operations and Engineering Manager
Managed the execution of technology-driven communications valued at more than $75 million. Mr. Bonneau supervised a staff of 45 in a communications integration group, including mentoring and training engineers. (11/03 - 1/05)

MULTI-MODAL

Portland Tri-Met Computer-Aided-Dispatch/Automatic Vehicle Location and Radio Replacement System - Project/Systems Integration Manager
Led the engineering and inspection of communications systems for the Tri-Met transit system in Portland, OR. Mr. Bonneau designed, installed, and commissioned four new trunked multicast P25 land mobile radio systems tower sites, 650 buses, 300 vans, 200 light rail vehicles, 490 handheld radios, and 21 dispatch consoles to support the customer needs. (2010 - 2013)

RAIL

LA Metro Expo LRT Communications - Project Manager

Oversaw the design, installation, and commissioning of communications and security systems engineering and inspection services on the Expo Line light rail transit (LRT) for LA Metro in Los Angeles. Mr. Bonneau supervised engineering of the CCTV, fire, intrusion, voice and data radio, and PA systems. He also integrated the signal system and installed the fiber optic backbone system. The Expo Line is an 8.6-mile line between downtown Los Angeles and Culver City, CA. (2009 - 2012)

Sound Transit Central Link LRT Communications System - Project/Systems Integration Manager
Led the design, installation, and commissioning of engineering and inspection of communications and security systems for the Sound Transit Central Link LRT in Seattle. Mr. Bonneau oversaw design of the network, SCADA, telephone, CCTV, fire, intrusion, central control, voice and data radio, and PA/variable message systems. He also integrated the signal system and installed the fiber optic backbone system. Central Link light rail makes 11 stops between Westlake Station in downtown Seattle and Sea-Tac Airport. (4/03 - 6/11)

LA Metro East Side Corridor - Project/Systems Integration Manager
Led the design, installation, and commissioning of engineering and inspection of communications and security systems for the LA Metro Eastside Corridor Project. This manually operated LRT system runs from Union Station in downtown Los Angeles as an extension of the Pasadena Gold Line to Atlantic Station. The project included 2 underground stations, 6 at grade stations, 5 interlockings, and more than 5.9 miles of new rail. The system provided the necessary subsystems to support the total operational requirements of the Metro Transit system. Mr. Bonneau was responsible for the design, integration, and commissioning of radio, telephone, PA/variable message signs, CCTV, cable transmission system (CTS), SCADA, intrusion detection and controlled access, fire detection and suppression monitoring, gas monitoring, seismic detection, facilities emergency management, communications power, and the tunnel portal surveillance systems. (2005 - 2009)

Seattle Sound RTA/PP 11-04 Sounder - Project/Systems Integration Manager
Led the design, installation, and commissioning of engineering and inspection of communications and tracking systems for the Seattle Sound Project RTA/PP 11-04 from Tacoma to Everett, WA. Mr. Bonneau oversaw the communications, including the fiber optic wide area network (gigabit ethernet), emergency telephone, CCTV, passenger information, and global positioning systems. (2005 - 2007)

Albanian State Railways - Project/Systems Integration Manager
Provided management and technical leadership using a hands-on approach to complete the microwave and trunked radio system for the Albanian State Railways in the Republic of Albania. The system provided radio coverage for

rail transport throughout the country utilizing four Harris Intraplex E1 microwave systems (5.8 GHz and 2.4GHz), towers, antennas, solar power systems, five UHF radio systems, control consoles, onboard train radio systems, and portable hand-held radios. (2004 - 2005)

Metro-North Railroad Hudson Line Fiber Optic Project - Project/Systems Integration Manager
Led the design, installation, and commissioning of a fiber-optic backbone along the Hudson Line for Metro-North Railroad. Mr. Bonneau supervised the design and construction management for the installation of a fiber-optic system along the entire 74-mile Hudson Line between Grand Central Station in Manhattan and Poughkeepsie, NY. The fiber-optic system provides more reliable communication with staff and customers. (2002 - 2005)

NYCT Automatic Train Supervision - Project Manager
Oversaw design, installation, and commissioning of a $200 million Automatic Train Supervision (ATS) system for NYCT Subdivision A rail territory, except for the No. 7 line. The ATS facilitates service management and consolidates most of the work currently performed at both the master towers and the subway control center in Brooklyn. The ATS also provides real-time centralized train traffic control for the A division from the rail control center operating theater, real-time train tracking, integrated voice communications with recording capabilities, and automatically developed train routing schemes based on schedule and service conditions. The system also provides improved coordination of emergency response activities between operating divisions to expedite solutions, and effective, centralized management for better on-time performance. (2000 - 2003)

St. Louis MetroLink LRT St. Clair County Extension - Project/Systems Integration Manager
Led the design, installation, and commissioning of the communications and security systems of the St. Clair Extension light rail transit (LRT) for St. Louis MetroLink in St. Louis, MO, and St. Clair County, IL. Mr. Bonneau also oversaw the engineering and inspection services for the St. Clair Extension, which follows a former CSX railroad right-of-way. The project extended light rail service between East St. Louis to Belleville, IL, serving the Belleville Area College, Scott Air Force Base, and Mid America Airport. The extension opened in May 2001. (1998 - 2001)

NYCT Stations PA/CIS Systems - Project/Systems Integration Manager
Oversaw the design, installation, and commissioning of PA/customer information screens (CIS) in 140 subway stations for New York City Transit (NYCT). Mr. Bonneau supervised the design and construction management of the installation of these communications systems. The information distributed through the PA/CIS system originates from NYCT's rail control center where customer service agents provide subway riders with an up-to-date service status either as audio, visual or synchronized audio and visual

information, including the popular countdown clocks showing the minutes until the next train arrives. (1997 - 2000)

St. Louis MetroLink Communications and Operations Systems - Project/ Systems Integration Manager
Oversaw installation of communications and operations systems for the St. Louis MetroLink light rail transit system. The project used miles of unused rail bed and railroad right-of-ways that were expandable, as well as an unused rail deck on the Eads Bridge and tunnels under the downtown central business district. MetroLink opened in 1993 as the first light rail system in the St. Louis region, connecting 16 stations over 14 miles from St. Louis County in Missouri to St. Clair County in Illinois. (1992 - 1994)

City of Boston Emergency Medical System Communications Control - Project Manager/Electronic Technician
Responsible for installation, configuration, testing, and emergency service for the Boston emergency medical service Pentacom PCX System, the backbone for the Central Medical Emergency Direction (CMED) system. Boston EMS operates the Metro-Boston CMED system providing coordination between EMS field providers and area hospitals throughout the 62 cities and towns in the metropolitan Boston area. Boston EMS staffs the CMED Center 24 hours-a-day linking field providers to hospitals, managing EMS channel use, providing EMS resource information, and offering command and control assistance during mass casualty incidents or disaster response in cooperation with on-scene commanders. (1990 - 1993)

Amtrak Boston CETC Communications Facility - Electronic Technician - Communications
Oversaw replacement of the Centralized Electronic Traffic Control (CETC) equipment in Boston for Amtrak. Mr. Bonneau was responsible for the technical installation and commissioning of the CETC equipment. He completed the ampitheatre installation, integrated communications with a tandem control system, and established and integrated all field control lines for signals and communications. (1989 - 1991)

RICHARD BROWN

Mr. Brown is a Director at FTI Consulting, Inc., an economic and consulting firm with offices located at 1101 K Street, NW, Washington, D.C. 20005. With 28 years of experience in the railroad industry, Mr. Brown specializes in providing financial, economic and analytical consulting services to North America's largest railroads. Mr. Brown is sponsoring portions of Sections III-D of CSXT's Reply Evidence relating to operating and General & Administrative expenses. Mr. Brown has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Brown received a Bachelor of Art degree in economics from Syracuse University in 1963 and a Master of Business Administration from Northwestern University in 1971. Prior to joining FTI, Mr. Brown spent 28 years with The Burlington Northern & Santa Fe Railway ("BNSF"), and its predecessor The Atchison, Topeka and Santa Fe Railway ("ATSF"). While at BNSF, Mr. Brown focused on strategic issues including the negotiation and implementation of the agreements between Union Pacific ("UP") and BNSF that were effected to facilitate the UP and Southern Pacific ("SP") merger. Additionally, he took a lead role in the analysis of the potential impact of regulatory changes on railroad marketing strategy.

Mr. Brown held numerous positions in Strategic Planning and Marketing at ATSF. He was involved in merger analysis and planning and played a key role in the attempted merger between ATSF and SP. Mr. Brown headed ATSF's Bulk Commodity Marketing which included Chemicals and Coal. In this role, he re-engineered a field sales organization with regional directors responsible for coaching and mentoring account managers. He also led ATSF's rail-truck retail efforts and negotiated several joint venture and business partnerships. While in this capacity, he developed a program for using rail truck transfer to increase car utilization. He implemented a joint venture with a major bulk truck line to bring intermodal rail service to dry bulk shippers. Mr. Brown has provided expert testimony in merger proceedings before the Interstate Commerce Commission and the Surface Transportation Board.

Mr. Brown's complete curriculum vitae is attached.

VERIFICATION

I, Richard Brown, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Richard Brown

Executed on this 9 day of July 2014.

Richard Brown

Director – Economic Consulting

rick.brown@fticonsulting.com

FTI Consulting
1101 K Street, NW
Suite B100
Washington, DC 20005
Tel: (202) 312-9100
Fax: (202) 312-9101

Education

MBA from Northwestern University Graduate School of Management

BS in Economics from Syracuse University

Richard Brown is a Director in FTI's Economic Consulting practice. With 28 years of experience in the railroad industry, Mr. Brown specializes in providing financial, economic and analytical consulting services to North America's largest railroads. Mr. Brown has provided expert testimony in merger proceedings before the Interstate Commerce Commission and The Surface Transportation Board. Mr. Brown is assigned to the DC office, however works from his home office at 100 Windwood Circle; Breckenridge, Colorado 80424.

Mr. Brown joined FTI Consulting in 1999. Much of the NIS group's work focuses on the economic and financial analysis of network industries, in particular different aspects of transportation. While at FTI, he has been involved in the analysis of rates, costs, and service in the railroad industry. Mr. Brown has worked extensively to develop expert testimony before the Surface Transportation Board ("STB") examining the reasonableness of railroad rates, railroads' applications for mergers and acquisitions. He also supported railroad internal strategic planning needs with respect to mergers and acquisitions and the impact of potential regulatory changes.

Prior to joining FTI, Mr. Brown spent 28 years with The Burlington Northern & Santa Fe Railway (BNSF), and its predecessor The Atchison, Topeka and Santa Fe Railway (ATSF). While at BNSF, he focused on strategic issues including the negotiation and implementation of the agreements between UP and BNSF that were effected to facilitate the UP-SP merger. Additionally, he took a lead role in the analysis of the potential impact of regulatory changes on railroad marketing strategy.

Mr. Brown held numerous positions in Strategic Planning and Marketing at ATSF. He was involved in merger analysis and planning and played a key role in the attempted merger between ATSF and Southern Pacific. He headed ATSF's Bulk Commodity Marketing which included Chemicals and Coal. In this role, Mr. Brown re-engineered a field sales organization with regional directors responsible for coaching and mentoring account managers; started a subsidiary company to handle tank containers as a retail intermodal options; and expanded on that with a joint venture with Bulkmatic, a major dry bulk truck line, to initiate a retail intermodal option for bulk containers.

Mr. Brown holds a Bachelors Degree in Economics from Syracuse University and an MBA degree from Northwestern University Graduate School of Management.

TESTIMONY

Surface Transportation Board

September 20, 2002 Docket No. 42070. Duke Energy Corporation v. CSX Transportation, Inc., Written Reply Evidence and Argument of CSX Transportation, Inc.

September 30, 2002 Docket No. 42069. Duke Energy Corporation v. Norfolk Southern Railway Company, Written Reply Evidence and Argument of Norfolk Southern Railway Company.

October 11, 2002	Docket No. 42072. Carolina Power & Light v. Norfolk Southern Railway Company, Written Reply Evidence and Argument of Norfolk Southern Railway Company.
January 19, 2010	Docket No. 42110. Seminole Electric Cooperative, Inc. v. CSX Transportation, Inc., Written Reply Evidence of CSX Transportation, Inc.
February 5, 2010	CV No. 3:08-CV-415-BR. -BNSF Railway Company v. Albany and Eastern Railroad Company, et al.
May 7, 2010	Docket No. 42113 Arizona Electric Power Cooperative, Inc. v. BNSF Railway Company and Union Pacific Railroad Company, Joint Reply Evidence of BNSF Railway Company and Union Pacific Railroad Company
November 10, 2011	Docket No. 42127 Intermountain Power Agency v. Union Pacific Railroad Company, Reply Evidence of Union Pacific Railroad Company

PATRICK J. BRYANT

Mr. Bryant is a Civil Engineer with STV, a professional firm offering engineering, architectural, planning, environment and construction management services located at 200 West Monroe Street, Suite 1650, Chicago, Illinois 60606. Mr. Bryant is sponsoring portions of Section III-F of CSXT's Reply Evidence relating to Earthwork and Trackwork. Mr. Bryant has signed a verification of the truth of the statements contained therein. A copy of the verification is attached hereto.

Mr. Bryant has more than 15 years of experience in rail, roadway, highway and bridge design and construction. He worked as Project Engineer on a CSXT coal terminal reconfiguration and as a Design Engineer for CSXT's Blue Island interchange with CN. He has also worked as a Track Engineer for the Elgin O'Hare West Bypass in Illinois and the City of Joliet's Regional Multimodal Transportation Center. Mr. Bryant worked as a Rail Engineer on the KCS Meridian Connection, performing design for the rail alignment and related earthwork as part of a realignment and connection construction. For Norfolk Southern, Mr. Bryant worked as a Rail Engineer on the Lakeside Dam Rehabilitation, designing the rail alignment and related earthwork as part of a 1.5 mile realignment at the intersection of the railroad, a state road and a dam.

Mr. Bryant earned his Bachelor of Science in civil engineering from the University of Illinois. His complete curriculum vitae is attached.

VERIFICATION

I, Patrick J. Bryant, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Patrick J. Bryant

Executed on this 16 day of July 2014.

Patrick J. Bryant, P.E.

Civil Engineer

Mr. Bryant is a civil engineer with more than 15 years of experience in rail, roadway, highway, and bridge design and construction, as well as site/civil and environmental engineering. He is experienced in designing rail alignments and track for light rail, commuter and freight railroads, and in coordinating among freight railroads, transit agencies and departments of transportation for track improvement projects. Mr. Bryant is currently serving as track engineer for the Illinois Department of Transportation (IDOT) Elgin O'Hare West Bypass, where he is providing conceptual track design for potential alignments and impacts to the Union Pacific Railroad, Canadian Pacific Railway, and Canadian National Railway. He has also performed track design for Kansas City Southern, the Northern Indiana Commuter Transportation District, and Norfolk Southern Railway.

Firm
STV

Education
Bachelor of Science, Civil Engineering, University of Illinois, Chicago

Professional Registrations
Professional Engineer: Illinois

Training
Amtrak Contractor Safety

Computer Skills
AutoCAD, Civil3D, MicroStation, GeoPak, HydroFlow, TR20, Paydirt, Visual Basic, AutoLisp, Eaglepoint

Project Experience

RAIL

CSX Curtis Bay Coal Terminal Reconfiguration - Project Engineer
Planning and designing the reconfiguration of CSX's Curtis Bay coal terminal in Baltimore. The project will consolidate yard tracks from the existing coal inbound yard and merchandise yard to provide three 130-foot inbound tracks to store unit coal trains. The project will also reconfigure the inbound lead tracks to the west yard to separate switching operations and implement new crossover arrangements at the existing three coal dumpers. The work is needed for CSX's planned expansion of ground storage at this facility. Mr. Bryant is overseeing the conceptual layouts and design for the yard reconfiguration. The most challenging aspect is staging the sequence of construction for the maintenance of operations to minimize impacts to CSX service during construction. (11/11 - Present)

CSX/Chicago/Gary Regional Airport Authority CSX Fort Wayne Line and NS Gary Branch Relocation - Design Engineer
Preparing track and civil plans for the reconfiguration of CSX's Fort Wayne Line onto the Norfolk Southern Railway (NS) Gary Branch in Gary, IN. The work is being performed as a component of the Chicago/Gary Regional Airport Authority's airport runway extension project and includes the addition of a new connection from CSX's Barr Subdivision to Canadian National's reconfigured Elgin, Joliet & Eastern Railway Line. A new industrial connection from the CSX Porter Subdivision to the Indiana Sugars manufacturing facility will also be added. In addition, the scope of work includes reconfiguring the Clarke Junction Interlocking between the Barr Subdivision, adding a new connection to the NS Chicago Line, and removing the Pine Junction Interlocking on the Barr Subdivision and improving design speed from 40 mph to 60 mph. This work will increase rail traffic capacity

and improve train movement into and out of Chicago. Mr. Bryant is also coordinating the design plans with the various railroads and transportation agencies. (2/11 - Present)

CSX CREATE WA-10 - Design Engineer
Preparing track and civil plans for the final design of the rail interlocking to allow the interchange between the Canadian National (CN) and CSX railroads in Blue Island, IL. As a component of the Chicago Region Environmental and Transportation Efficiency (CREATE) program, the project involves reconfiguring the CSX Vermont Street interlocking to provide a universal connection to the CN main line. Expanding this interlocking between these two main lines will increase rail traffic capacity and improve train movement through Chicago. Mr. Bryant is also coordinating the design plans with the various railroads and transportation agencies. (2011 - Present)

IDOT Elgin O'Hare West Bypass - Track Engineer
Coordinating design plans with various railroads and transportation agencies and preparing staging plans as part of STV's freight rail coordination for the $3.9 billion Elgin O'Hare West Bypass in Cook County, IL. Mr. Bryant developed conceptual track engineering plans and cost estimates for potential track alignments and impacts to the railroads during Phase I of this project. He also developed staging plans, cross-sections, plan profiles, and drainage plans. The project has now moved into Phase II, and STV is coordinating the approved plans among the Union Pacific, Canadian Pacific, and Canadian National freight railroads and the project team. The primary objective of the coordination is to keep the railroads informed of project progress and to resolve any potential conflicts at an early stage. Mr. Bryant is coordinating work with the planning team during the alternative design process and is advising them of potential rail impacts. He is also coordinating plans with signals and highway improvement work being performed simultaneously. (10/08 - Present)

NICTD Kensington Interlocking Improvement CM Services - Track Engineer
Developed track engineering for construction management (CM) services for improvements at the Kensington Interlocking, including the addition of a second Northern Indiana Commuter Transportation District (NICTD) route across the connect to the Metra electric mains. Mr. Bryant made recommendations for alterations to the original track design that are being incorporated into the final design and construction. He also performed office engineering tasks as well as field inspections. STV oversaw all aspects of the contractor's construction methods, and provided a precondition survey to identify existing conditions of the rail and right-of-way in the area of the Kensington Interlocking limits, including the existing signal system, structures, and track appurtenances. (6/09 - 6/12)

UP vs. Intermountain Power Agency Rate Case Litigation Cost Assessments - Project Engineer
Assembled the planning, engineering, and construction costs to build a hypothetical contemporary operating railroad for the Union Pacific Railroad (UP). Services included a complete itemization, justification, and documentation of all transportation, material, and labor construction costs associated with a contemporary construction costing. All submittals were entered as evidence to the Surface Transportation Board to justify contested rates for this coal rate case. The cost assessments Mr. Bryant worked on included major earthwork and culvert construction. (8/11 - 12/11)

CSX CREATE CSX CREATE B-12 Third Main Construction Oversight - Field Inspector
Performed field inspections for the construction of a third mainline along the Beltway Corridor from 123rd Street to CP San Francisco in Alsip and Blue Island, IL, which includes new track and upgrades to existing track. Part of the Chicago Region Environmental and Transportation Efficiency (CREATE) program, this additional mainline will increase freight rail capacity and decrease travel times within the area. A new rail bridge over 127th Street was also constructed, including associated signal work. Mr. Bryant provided inspections to make sure the work was performed according to the project plans and specifications. (9/10 - 7/11)

TTC Transit City LRT Program Project Management Services - Track Design QC
Provided quality control for track and civil plans, as part of the proposed 13.6-km (8.5-mile) Toronto Transit Commission (TTC) underground light rail transit (LRT) line and new Sheppard's Street station in Toronto, Canada. Mr. Bryant verified that the project was designed according to the agency's design criteria and that it is constructible. He checked clearances, materials, profile grades, and drainage design. (4/10 - 2/11)

St. Louis Metro East Riverfront Interlocking - Track Engineer
Prepared track and civil plans for the design of a new interlocking between the East Riverfront MetroRail station and the historic Eads Bridge, which connects St. Louis with East St. Louis, IL, over the Mississippi River. The Eads Bridge is a 2-level structure carrying two sets of tracks for the MetroRail light-rail transit system on its lower level and a 4-lane highway on the upper level. STV designed a new asymmetrical diamond cross-over interlocking within the East Arcade located east of the bridge. To construct the new interlocking, approximately 206 feet of the roadway deck and superstructure was removed. The firm designed the new interlocking on a tight schedule and within a restricted area, making the design work challenging. The interlocking is 185 feet long and the cross-over is confined within an 18-foot-wide area. Mr. Bryant performed track calculations and geometry to develop multiple track alignment options. The plans were then presented to the client, which chose an option most suitable to its needs. Mr. Bryant prepared track and civil design plans using AutoCAD. He also coordinated with other project disciplines to develop conduit plans for multiple systems including electrical, communications, overhead catenary

systems, and signals, all of which are located within the restricted area. (11/09 - 6/10)

NS PennDOT SR 0028 Improvement - Track Engineer
Facilitated track design to address Norfolk Southern Railway (NS) capacity issues during the Pennsylvania Department of Transportation (PennDOT) improvement of SR 0028 in Pittsburgh. To allow for single-tracking during roadway improvements, NS Control Point (CP) Herr will be eliminated. For NS to have capacity for this interlocking removal and single-tracking, STV relocated two approaching interlockings: one at CP Etna, and one at CP Sharp. Mr. Bryant designed track geometry, plan and profile for relocation of the interlockings as well as extension of the westward main track No. 2 and controlled siding. The total project will increase block capacity by 2,700 feet. (8/08 - 5/09)

KCS Meridian Connection - Rail Engineer
Performed design for the rail alignment and related earthwork as part of the construction of a 4-mile realignment and connection of Norfolk Southern Railway (NS) and the Kansas City Southern (KCS) railway on the Meridian Speedway in Meridian, MS, as part of an on-call contract. The project required extensive coordination between the KCS and NS, resulting in an operational staging plan suitable for both parties. (10/08 - 7/09)

NS Lakeside Dam Rehabilitation - Rail Engineer
Responsible for the design of the rail alignment and related earthwork as part of the proposed construction of a 1.5-mile realignment of Norfolk Southern Railway (NS) in Macon, GA. The proposed alignment was partially over a 60-foot-high earthen dam. The project, which required coordination among many stakeholders, was a complex intersection of the railroad, a major state route, and the dam. (8/08 - 12/08)

BRIDGES

CSX Manville Bridge Reconstruction - Track Engineer
Prepared track designs to address construction staging for CSX's reconstruction of a railroad bridge over a waterway in Manville, NJ. The new structure increases CSX's capacity from one track to two tracks in the Reading subdivision. Mr. Bryant designed track geometry, plan and profiles, and temporary shoofly alignments for the staging plans and final rail alignment. (7/09 - 8/09)

CDOT Montrose Harbor Bridges and Underpasses - Project Engineer
Provided engineering services for the reconstruction of four concrete arch bridges originally built in the 1930s in Chicago's Montrose Harbor Park. STV evaluated rehabilitation and reconstruction alternatives for each of the structures. Because the bridges are located in a historic park setting, STV coordinated with the project architect to develop a structural system that maintained the existing architectural features while meeting current highway

bridge standards. Mr. Bryant designed maintenance of traffic plans, which included assessing current traffic volume and developing a plan would have minimal impact to commuters during construction. He also assisted with the drainage design plans for the Chicago Department of Transportation (CDOT) project. (4/08 - 1/09)

HIGHWAYS/ROADWAYS

Kane County DOT Fabyan Parkway at Van Nortwick Avenue Phase II Intersection Improvements - QA/QC
Performed QA/QC for STV's Phase II engineering services for the Fabyan Parkway and Van Nortwick Avenue intersection in Batavia, IL, for the Kane County Department of Transportation (DOT). The scope of work included road widening and the addition of a left-turn lane, as well as data collection, geotechnical services, and drainage design. The firm also extended lateral pipes in the widened area, replacing inlets along curb lines and a culvert to correct a drainage problem. STV prepared construction documents in accordance with the IDOT Bureau of Local Roads manual and Kane County design standards. Mr. Bryant performed QA/QC of the final Phase II engineering plans STV submitted. (6/09 - 2/10)

IDOT US 150 Phase I Study - Civil Engineer
Provided civil design for Phase I engineering for the preparation of a Categorical Exclusion Group II report for the widening of US 150 in Tazewell County, IL, to three lanes. Mr. Bryant was responsible for roadway design, including grading, geometric alignments, and easements. (7/08 - 8/08)

Kendall County Highway Department/Sharp Homes Hunter's Ridge Road Widening - Project Engineer
Designed roadway plans, including profiles, horizontal alignments, cross sections, and drainage systems, for the widening of a 2-lane rural road to a 4-lane arterial with multiple intersections to support new residential developments in Joliet, IL. The project included widening a 1.5-mile stretch of roadway to accommodate the 130-acre Hunter's Ridge and 90-acre Jones Road subdivisions developed by Sharp Homes. Mr. Bryant was also responsible for developing site plans for the subdivision projects. (5/05 - 3/06)

Kendall County Highway Department/Lakewood Homes Ridge Road Widening - Project Engineer
Supervised the design of roadway plans, including profiles, horizontal alignments, cross sections, and drainage systems, for 2 miles of a major 4-lane arterial in Joliet, IL. Mr. Bryant was also responsible for developing roadway improvements funded by Lakewood Homes. All plans were submitted to the Kendall County Highway Department for review. (10/04 - 3/05)

ISTHA I-294 Reconstruction - Project Engineer
Managed the design of roadway plans, including profiles, horizontal alignments, cross sections, and drainage systems, for the reconstruction of 6 miles of I-294 in Illinois. Mr. Bryant was also responsible for developing special provisions and preparing project cost estimates for this Illinois State Toll Highway Authority (ISTHA) project. (6/03 - 4/05)

CDOT Racine Avenue Improvements - Project Engineer
Facilitated the design of roadway plans, including profiles, horizontal alignments, cross sections, and drainage systems associated with the improvement of a 0.8-mile segment of Racine Avenue in Chicago. Mr. Bryant was also responsible for developing special provisions and preparing project cost estimates for this Chicago Department of Transportation (CDOT) project. (7/03 - 1/04)

CDOT 37th Street Improvements - Project Engineer
Developed roadway plans, including profiles, horizontal alignments, cross sections, and drainage systems for improvements, to a 0.5-mile stretch of 37th Street in Chicago. Mr. Bryant also developed special provisions and prepared project cost estimates for the Chicago Department of Transportation (CDOT) project. (7/03 - 1/04)

IDOT Higgins Road Rehabilitation - Project Engineer
Responsible for the design of roadway plans, including profiles, horizontal alignments, cross sections, and drainage systems, for the rehabilitation of 4 miles of Higgins Road in Schaumburg, IL. Mr. Bryant was also responsible for developing special provisions and preparing project cost estimates. (12/00 - 1/03)

IDOT Golf Road Rehabilitation - Project Engineer
Designed roadway plans, including profiles, horizontal alignments, cross sections, and drainage systems, for the rehabilitation of 4 miles of Golf Road in Schaumburg, IL. Mr. Bryant also developed special provisions and prepared project cost estimates. (10/00 - 1/03)

DuPage County Highway Department Road Improvement Projects - Construction Engineer
Inspected the resurfacing and repair of numerous county roads in DuPage County, IL, including Bloomingdale Road, Gary Avenue, Glen Ellyn Road, Naperville Road, 75th Street, and 63rd Street. Mr. Bryant also provided QA/QC of contractors' work on these road construction projects. (4/95 - 9/99)

ISTHA I-90 Improvements - Project Engineer
Responsible for the design of roadway plans, including profiles, horizontal alignments, cross sections, and drainage systems, for improvements to I-90 in Illinois. Mr. Bryant was also responsible for developing special provisions

and preparing project cost estimates for this Illinois State Toll Highway Authority (ISTHA) project. (11/97 - 4/98)

Cook County Highway Department Ashland Avenue - Construction Engineer
Inspected the construction of 1.5 miles of Ashland Avenue in Chicago. Mr. Bryant also provided QA/QC of contractors' work on the highway and bridge construction. (4/97 - 11/97)

ISTHA Randall Road/I-90 Interchange - Project Engineer
Designed roadway plans, including profiles, horizontal alignments, cross-sections, and drainage systems, for the Randall Road/I-90 interchange in Elgin, IL. Mr. Bryant was also responsible for developing special provisions and preparing cost estimates for the Illinois State Toll Highway Authority (ISTHA). (10/96 - 4/97)

Cook County Highway Department Lehigh Avenue - Construction Engineer
Responsible for the construction of 1.5 miles of Lehigh Avenue in Morton Grove, IL. Mr. Bryant provided QA/QC of the contractors' work. (3/96 - 12/96)

IDOT Route 59 - Project Engineer
Prepared roadway plans, including profiles, horizontal alignments, cross sections, and drainage systems, as part of the design of 5 miles of Route 59 in Naperville, IL. Mr. Bryant was also responsible for developing special provisions and preparing cost estimates. (9/94 - 4/95)

ISTHA I-294 Improvements - Construction Engineer
Responsible for construction inspection during the repair and resurfacing of 6 miles of I-294 in Rosemont, IL. Mr. Bryant provided QA/QC of contractors' work on this Illinois State Toll Highway Authority (ISTHA) project. (4/94 - 9/94)

SITE PLANNING

Sharp Homes Commercial Development Projects - Project Engineer
Developed site plans for various commercial development projects in Joliet, IL. Mr. Bryant oversaw spur track design, road design, grading design, geometric alignments, storm water management design, easement coordination, and utility design and coordination for the new Sharp Industrial Park, three commercial lots, and a railroad distribution center at the Mound Road Commercial Park. (5/05 - 5/08)

O&S Holdings Bridge Street Mall - Project Engineer
Responsible for site plans for a 320-acre mall development project in Joliet, IL. The proposed mall would contain numerous stores, restaurants, and medical and professional offices. Mr. Bryant was responsible for parking lot,

road, and grading design; geometric alignments; easement coordination; storm water management system design; and utility design and coordination. (10/07 - 4/08)

Taking Care of Business Inc. Crete Marketplace - Project Engineer
Developed site plans for a 100-acre commercial development project in Crete, IL. This commercial development contains two major department stores, a fast-food restaurant, two gas stations, and 12 other useable lots. Mr. Bryant was responsible for parking lot, road, and grading designs; geometric alignments; easement coordination; storm water management design; and utility design and coordination. (3/07 - 4/08)

IDI Rock Run Industrial Park - Project Engineer
Provided road and grading designs, geometric alignments, easement coordination, and utility design and coordination for this 60-acre development in Joliet, IL. (4/07 - 9/07)

Chovan Commercial Subdivision - Project Engineer
Developed site plans for a 20-acre commercial development project in Joliet, IL, consisting of medical and professional offices. Mr. Bryant was responsible for parking lot, road, and grading design; geometric alignments; easement coordination; storm water management design; and utility design and coordination. (2/06 - 9/07)

KB Homes Streams of Plainfield Residential Subdivision - Project Engineer
Provided road design, grading design, geometric alignments, easement coordination, and utility design and coordination for this 80-acre residential subdivision in Plainfield, IL. (6/06 - 4/07)

Gallagher and Henry Parker Road Residential Subdivision - Project Engineer
Responsible for road and grading designs, geometric alignments, easement coordination, and utility design and coordination for this 120-acre residential subdivision in Homer Glen, IL. (2/06 - 1/07)

Sharp Homes Horton Farms Residential Subdivision - Project Engineer
Provided road and grading design, geometric alignments, easement coordination, storm water management, and utility design and coordination for this 80-acre residential subdivision in Joliet, IL. (1/06 - 8/06)

TRANSPORTATION FACILITIES

UP CREATE B-2 Project - Project Engineer
Delivering site design engineering services for the reconstruction of the Metra's Union Pacific West Line's passenger stations in Berkeley and Bellwood, IL, as part of the Chicago Region Environmental and Transportation Efficiency (CREATE) program. STV is providing

engineering and architectural design services to modify the stations to accommodate a third mainline track being constructed by Union Pacific Railroad (UP). The station upgrades consist of new center platforms, warming shelters, and pedestrian underpasses with retaining walls. Mr. Bryant is providing site design, including grading, drainage, signage, and construction staging. The project is currently in the construction phase, and Mr. Bryant is providing construction support services. (3/11 - Present)

City of Joliet Regional Multimodal Transportation Center - Track Engineer

Provided railroad coordination and designs for infrastructure improvements as part of the development of a multimodal transportation center in Joliet, IL. Several modes of transportation were relocated into a central facility that connects to the historic Joliet Union Station. This venture could eventually be a stop on the future high-speed passenger rail line, linking Chicago with St. Louis. The transportation center is located within the Joliet UD Interlocking, which includes Union Pacific, Burlington Northern Santa Fe, Amtrak, and the Metra Rock Island District and Heritage Corridor rail lines. Mr. Bryant developed designs for the infrastructure improvements related to track realignments, platform configurations, interlocking modifications, bridge rehabilitations, and construction staging. (9/09 - 6/11)

KAUSTUV CHAKRABARTI

Mr. Chakrabarti is a Senior Director of Economic Consulting in the Network Industries Strategies ("NIS") Group of FTI Consulting, Inc., an economic and consulting firm with offices located at 1101 K Street, NW, Washington, D.C. 20005. Mr. Chakrabarti is sponsoring portions of Section III-D related to certain operating expenses, but excluding General & Administrative and Maintenance of Way costs, of CSXT's Reply Evidence. Mr. Chakrabarti has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Chakrabarti holds a Bachelor of Science degree in chemistry and economics from the College of William and Mary. He also has a Master of Arts in applied economics from Johns Hopkins University.

Mr. Chakrabarti has provided economic and financial analysis to the transportation, telecommunications, and energy industries. He has worked on transportation industry analysis to estimate and forecast operating expenses, investment costs, and variable costs. He has applied the Board's URCS regulatory costing model in SAC, Simplified SAC and Three-Benchmark rate cases.

Mr. Chakrabarti's complete curriculum vitae is attached.

VERIFICATION

I, Kaustuv Chakrabarti, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Kaustuv Chakrabarti

Executed on this 14 day of July 2014.

Kaustuv Chakrabarti

Senior Director – Economic Consulting

Kaustuv.Chakrabarti@fticonsulting.com

FTI Consulting
1101 K Street, NW
Suite B100
Washington, DC 20005
Tel: (202) 312-9100
Fax: (202) 312-9101

Education
Master of Arts in Applied Economics from the Johns Hopkins University

Bachelor of Science in Chemistry and Economics from the College of William and Mary

Kaustuv Chakrabarti is a Senior Director at FTI Consulting in the Network Industries Strategies group within the Economic Consulting practice in the Washington, DC office. Mr. Chakrabarti conducts economic and financial analysis for primarily the transportation, telecommunications, and energy industries. He holds an M.A. in Applied Economics from the Johns Hopkins University and a Bachelor of Science, majoring in Chemistry and Economics, from the College of William and Mary, and is a CFA (Chartered Financial Analyst) charterholder.

Background

Mr. Chakrabarti has developed analyses in the transportation industry to estimate and forecast operating expenses, investment costs, variable costs, and other income-related elements. He has constructed and utilized databases to analyze operational data and in support of strategic decision-making. He has applied the STB's URCS regulatory costing model and the above analyses in rate cases brought before the STB under the Full SAC, Simplified SAC, and Three-Benchmark standards. He has also conducted valuations of firms or business segments outside of the transportation industry. For these valuations, he analyzed financial statements and other income data to develop various discount cash flow models.

Mr. Chakrabarti has conducted numerous business case analyses for the federal government in voice telephony, information technology, and building construction. In these efforts, he worked with clients to design potential investment solutions; compare the costs, benefits, and risks of each; and identify the optimal solution.

JEREMIAH DIRNBERGER

Jeremiah Dirnberger is a Manager – Network Modeling for the Yard and Terminal team within the Network Modeling Group at CSX Transportation. Mr. Dirnberger's office is located at 500 Water Street, Jacksonville, Florida 32202. Mr. Dirnberger is sponsoring portions of Section III-C of CSXT's Reply Evidence related to yard sizing. A copy of his verification is attached hereto.

Mr. Dirnberger holds a Master of Science in Civil Engineering from the University of Illinois Urbana-Champaign. He also holds a Bachelor of Science degree in Industrial and Management Engineering from Montana State University. Mr. Dirnberger has over eight years of experience working with railroads in the area of terminal capacity solutions. He led the CSXT effort to build its Hump Yard Simulation System (HYSS) and supports on-going network yard and terminal strategy through modeling and data analysis. Prior to working at CSXT Mr. Dinrberger worked for Canadian Pacific Railway Company in the area of terminal capacity improvement. Mr. Dirnberger served in the Montana and Indiana Air National Guard.

Mr. Dirnberger's curriculum vitae is attached.

VERIFICATION

I, Jeremiah Dirnberger, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Jeremiah Dirnberger

Executed on this 10th day of July 2014.

Jeremiah Dirnberger
500 Water St J315 • Jacksonville, FL 32202 • (904) 359-3650 •
jeremiah_dirnberger@csx.com

Objective

To bring value to the transportation industry by providing innovative solutions to twenty-first century challenges

Education

M.S. Civil Engineering (Transportation Systems Emphasis)
University of Illinois Urbana-Champaign – August 2006

B.S. Industrial & Management Engineering (with Honors)
Montana State University – May 2003

A.A.S. Information Systems Technology
Community College of the Air Force – August 2005

Work Experience

Yard and Terminal Capacity Solutions (September 2010-Present)
CSX Transportation – Jacksonville, FL
-Currently leading the Yard and Terminal sub-team within the Network Modeling group (Manager-Network Modeling)
-Led the CSX effort to build the Hump Yard Simulation System (HYSS) for six hump yards with Innovative Scheduling as the consultant (earned the 2011 Chairman's Award of Excellence)
-Supporting the on-going Network Yard/Terminal Strategy with modeling, data analysis and vision
-Directly worked with Transportation front-line managers and HQ managers to identify, analyze, recommend and implement operational and strategic network improvements
-Providing Project Management support for the Yard Planner initiative
-Presented at INFORMS, AREMA and JRC (Joint Rail Conference)
-Member of AREMA Committees 14 (Yards & Terminals) and 16 (Economics of Railway Engineering & Operations)

Terminal Capacity Improvement Planning (January 2008-September 2009)
Canadian Pacific Railway – Calgary, AB and Milwaukee, WI
-Supervised co-op/intern students and full-time analysts as the lead for this work
-For the ten major classification yards on CP, calculated the current processing capacity and determined a recommended course of process and capital improvements to stay ahead of projected demand
-Identified improvement opportunities and developed business cases to capitalize on those opportunities
-Managed multiple project locations and timelines simultaneously
-Over $1 million in estimated savings annually due to capacity improvements

Yard Process Improvement (August 2006-December 2008)
Canadian Pacific Railway – Calgary, AB
-Traveled entire CP system to help successfully implement classification yard workflow management systems through one-on-one training
-Worked directly with senior yard and network managers to conduct Lean and process improvement projects at all of the major classification facilities
-Worked with a front-line management team to conduct an assessment of the effectiveness of remote-control operations at a major terminal facility, the findings of the cost-benefit analysis were implemented resulting in a $1.8 million savings over a 4-year period

Graduate Research Assistant (August 2004-August 2006)
Railroad Engineering Program UIUC – Urbana, IL
-Conducted research and published thesis entitled "Development and Application of Lean Railroading to Improve Classification Terminal Performance"
-Focus of research was to improve customer service by improving classification terminal capacity
-Worked with CN, CP, UP, BNSF and NS for this research
-Supervised 2 undergrad assistants
-Published academic paper in the Transportation Research Record No. 1995
-Presented research at AREMA, IIE, TRB, INFORMS and WCRR

Military Experience

Montana and Indiana Air National Guard (March 2001-March 2007)
Command Post Controller – Staff Sergeant (E-5), recommended for officer slot

JOHN A. ENNIS

Mr. Ennis is a Senior Director in the Real Estate Solutions practice of FTI Consulting, Inc., an economic and consulting firm with an office located at 101 Eisenhower Parkway, Roseland, New Jersey 07068. Mr. Ennis is sponsoring portions of Section III-F of CSXT's Reply Evidence related to Real Estate. Mr. Ennis has signed a verification of the truth of the statements contained therein. A copy of the verification is attached hereto.

Mr. Ennis earned his Bachelor of Science degree in finance from Dickinson University. He has over 17 years of experience providing real estate consulting and valuation services. His responsibilities have included the valuation of individual properties and portfolios for financial reporting, lending, estate planning, gifting, partnership issues, eminent domain, purchase price allocations, ad valorem taxation, litigation support, public offerings, and portfolio analysis.

Prior to joining FTI, Mr. Ennis worked in the Valuation Advisory Services Group at Cushman & Wakefield. He is affiliated with the Appraisal Institute and is a certified appraiser in several states.

Mr. Ennis' biography, with additional information and experience, is attached.

VERIFICATION

I, John A. Ennis, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

John A. Ennis

Executed on this 16th day of July 2014.

John Ennis

Senior Director — Corporate Finance/Restructuring

john.ennis@fticonsulting.com

101 Eisenhower Parkway

Roseland, NJ 07068

Tel: +1 973 852 8139

CERTIFICATIONS

New Jersey General Appraiser: 42RG00144900

New York General Appraiser: 46000035469

Georgia General Real Estate Appraiser: 319940

Florida General Real Estate Appraiser: RZ3160

PROFESSIONAL AFFILIATIONS

Appraisal Institute

EDUCATION

B.S. in Finance, Fairleigh Dickinson University

John Ennis is a senior director in the FTI Real Estate Solutions practice and is based in Roseland, New Jersey. Mr. Ennis' responsibilities include the valuation of individual properties and portfolios for financial reporting, lending, estate planning, gifting, partnership issues, eminent domain, purchase price allocations, ad valorem taxation, litigation support, public offerings, and portfolio analysis he both sources and leads a broad range of client engagements including forensic accounting, financial due diligence, and other real estate related matters.

Mr. Ennis has over 17 years experience providing real estate consulting and valuation services for retail, office, industrial, multifamily, hospitality and development land valued in excess of $8.0 billion, including valuation for financial reporting, acquisition underwriting, estate planning, gifting, partnership issues, purchase price allocations, cost segregation, ad valorem taxation, litigation support, public offerings, market and feasibility studies, and portfolio analysis. Mr. Ennis has worked with banks, insurance companies, CMBS lenders, funds, developers, property owners and law firms.

Prior to joining FTI Consulting, Mr. Ennis worked in the Valuation Advisory Services Group at Cushman & Wakefield.

Mr. Ennis holds a B.S. in finance from Fairleigh Dickinson University. John has completed all coursework toward the MAI designation, has completed all experience reviews, has taken the comprehensive exam, and is preparing the demonstration appraisal report.

EUGENE FARRELL

Mr. Farrell is an Engineering Specialist with STV Inc., a professional firm offering engineering, architectural, planning, environmental, and construction management services with offices at 5200 Belfort Road, Suite 400, Jacksonville, Florida 32256. Mr. Farrell has more than 40 years of experience in signal design, installation, repair, testing, and commissioning. Mr. Farrell is sponsoring portions of Section III-F of CSXT's Reply Evidence relating to Signals and Communications. Mr. Farrell has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Farrell has substantial real world experience with signals for rail projects, rail systems, and transportation facilities. Prior to joining STV, Mr. Farrell spent 28 years as the Engineer of Signal Maintenance with the Long Island Rail Road managing 200 employees in the systemwide maintenance and repair of signals systems. He has worked as a Signal Inspector, reviewed signals design, and supervised signal construction.

Mr. Farrell's complete curriculum vitae is attached.

VERIFICATION

I, Eugene R. Farrell, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Eugene R. Farrell

Executed on this 16 day of July 2014.

Eugene R. Farrell

Engineering Specialist

Mr. Farrell has more than 40 years of experience in signal design, installation, repair, testing, and commissioning. He has inspected the full range of signal equipment, including microprocessors, train relays, switches and cables, automatic speed control, audio frequency track circuits, and supervisory control and data acquisition (SCADA) systems. Mr. Farrell is skilled in interfacing signal equipment with traction power and communication systems and track structures. Prior to joining STV, he had a 28-year career with the Long Island Rail Road (LIRR), including serving as Engineer of Signal Maintenance. In this capacity, Mr. Farrell was responsible for supervising more than 200 employees in the systemwide maintenance and repair of signal systems, and managed system upgrades involving the installation of automatic speed control and audio frequency track circuits, laying the groundwork for automatic train control (ATC). He coordinated extensively with the LIRR Traction Power, Track, and Transportation departments to bring about seamless interface of the various systems and to minimize impacts to LIRR operations.

Employee No.
01806

Department No.
136

Office Location
Philadelphia, PA

Year joined firm
9/18/00

Years with other firms
28

Education
High School Diploma; Hauppauge High School (1967)

Signal Training School, Supervisor Training Classes; U.S. Navy Training Schools (1967 -1971)

Training
Roadway Worker Safety Course; Long Island Rail Road (LIRR)

Roadway Worker Safety Course; Amtrak

Roadway Worker Safety Course; MetroLink

Roadway Worker Safety Course; CSX

Roadway Worker Safety Course; North County Transit District

Roadway Worker Safety Course; San Diego Trolley

Safety Awareness and Hazmat Awareness Seminars; LIRR

Customer Breakthrough Service Seminar; LIRR

Project Experience

RAIL: LIGHT RAIL

St. Louis Metro Eads Bridge Rehabilitation and UMSL Interlocking Signal Installation - Signal Inspector

Inspected the installation, testing and commissioning of a new control point at the University of Missouri St. Louis (UMSL) for Metro St. Louis. Mr. Farrell oversaw the installation of the universal crossovers and color lite signals as well as connecting cables and outlying track circuits. He reviewed contractor submittals and prepared daily progress reports with site photos which he submitted to Metro management. (1/13 - 3/13)

FTA SF Muni Project Management Oversight Services - Signal Specialist

Reviewed signal drawings and specifications as part of a project management oversight (PMO) task order contract with the FTA for the implementation of several San Francisco Municipal Railway (Muni) projects to increase the reliability and capacity of the light rail subway system in San Francisco. Mr. Farrell provided recommendations for proposed extension tie-ins to the existing Muni line and coordination of construction documents dealing with signals for the line. (3/07 - 5/10)

CATS South Corridor Light Rail Project - Signal Inspector

Provided inspection services during the installation, testing, and commissioning of signal systems for the Charlotte Area Transit System (CATS) South Corridor Light Rail Project (SCLRP), the first of five routes in a nearly $4 billion transit program to provide a comprehensive transit system for the Charlotte-Mecklenburg area of North Carolina. The first light rail transit (LRT) system in the state, the SCLRP is projected to attract approximately 17,000 riders per day by 2025, providing a modern, environmentally friendly transportation system stimulating economic growth in the region through transit-oriented development. Mr. Farrell inspected and tested supervisory control and data acquisition (SCADA) systems, microprocessors, switches, highway grade crossings, cables, track circuits, and automatic train control systems for the LRT system. He reviewed test procedures and verified the quality of the installations and testing. In addition, Mr. Farrell coordinated work between the agency and the utility provider to support plans to power the signal and train control system (8/07 - 10/07)

Training (Cont'd.)
Frontline Leadership Course; LIRR

Annual Book of Rules Review; LIRR (1971 - 1998)

MBTA Greenbush Line Rail Restoration Design-Build - Signals Design Reviewer

Reviewed signal drawings for several interlockings to support the $320 million Massachusetts Bay Transportation Authority (MBTA) restoration and reconstruction of the largely out-of-service railroad right-of-way (ROW) on the South Shore of Massachusetts. The project included 18 miles of track, the rehabilitation of 8 rail bridges and 10 highway bridges, the implementation of 7 new stations, a new signal and communication system, and a layover facility at the end of the line in the Greenbush area of Scituate, MA. Mr. Farrell reviewed and corrected signal drawings, as necessary, for safe braking control lines to verify proper speeds and distances in each signal block. (7/07 - 8/07)

NJ TRANSIT Newark Light Rail Broad Street Extension CM - Signal Inspector/Signals Design Review

Reviewed 30% and 60% design submittals to verify quality and consistency of signal design, including the supervisory control and data acquisition (SCADA) system, for a 1.5-mile rail link extension of the Newark City Subway connecting the Broad Street Station with Pennsylvania Station in Newark, NJ. Mr. Farrell subsequently oversaw the contractor's work during the overnight hours for the $120 million extension, including cable installation, testing, and termination. He coordinated track outages with city subway personnel, and monitored and assisted weekend cutovers with Government Emergency Telecommunications Service (GETS) personnel for interfacing the line extension with the existing subway. This included onboard equipment upgrades to 120 subway cars, the addition of electronic and vane type track circuits, SCADA, and the installation of radio cabling. Mr. Farrell also oversaw testing and integration of a new signal system. (2000; 2/06 - 5/06)

St. Louis Metro St. Clair County MetroLink Light Rail Transit Extension - Resident Signal Engineer

Oversaw a $3.3 million signal contract for this 26-mile light rail system extension on the Illinois side of the Mississippi River from East St. Louis, MO, to the new major regional airport at Mid-America in St. Clair County. Mr. Farrell held weekly progress meetings with the contractor, processed submittals, project change requests (PCRs), and change orders; reviewed construction and as-built circuit plans; and reviewed and approved monthly pay applications. (8/02 - 8/03)

SYSTEMS

SANDAG North County Transit District Tecolote and Washington Crossovers - Signal Inspector

Provided inspection services for the installation, testing, and commissioning of two new control points (CP's) at CP Cudahy and CP Convair, in San Diego, for the San Diego Association of Governments (SANDAG). Mr. Farrell oversaw the installation of the universal crossovers at CP Cudahy and a single crossover at CP Convair with color lite signals as well as the connecting cables. He assisted in the setup and testing of adjacent highway grade crossing approach changes due to the installation of CP Convair. Mr. Farrell reviewed contractor submittals including test plans and cutover procedures. He made daily progress reports with site photos to the project management team as well as attending weekly update meetings. (6/13 - 7/13; 9/13 - 10/13)

CSX CREATE GEC Services B12 and WA-2 - Construction Manager

Oversaw the upgrade and installation of four major control points and designed and supervised the conduit system for the reconfiguration of a busy control point for CSX Transportation in Chicago. The tasks, Project B12 and WA-2, are part of the Chicago Region Environmental and Transportation Efficiency Program (CREATE) program. Project B12 includes the construction of a third main line along the Beltway Corridor from 123rd Street to CP San Francisco in Alsip and Blue Island, IL. This additional main line increases freight rail capacity and decreases travel times within the area. Mr. Farrell supervised three CSX teams at four control points and coordinatg1

ed the installation of new switch machines for crossovers and placement of three track signal cantilevers for new signal locations. He also recommended and coordinated the removal and replacement of crossovers while keeping the existing system operational. Mr. Farrell also successfully planned and executed three major cut-ins. (11/10 - 7/11)

MWRA Commercial Street Grade Crossing - Signal Specialist

Assessed drawings, specifications, and contractor submittals for the reconfiguration and upgrade of the Fore River Railroad Corporation (FRRC) branch line highway grade crossing at Commercial Street in Braintree, MA, for the Massachusetts Water Resources Authority (MWRA). Mr. Farrell reviewed and provided recommendations for construction planning and implementation. He recommended the circuit design for the grade-crossing operation and is verifying contractor submittals for compliance with approved agency specifications. Mr. Farrell oversaw the installation, testing, and commissioning of the Commercial Street highway grade crossing. He also reviewed final submittals and in-service operation. (4/08 - 7/10)

LIRR Little Neck Parkway Quiet Zone - Technical Project Manager

Developed an engineering analysis and design for the installation of a quiet zone at the Long Island Rail Road (LIRR) Little Neck Parkway highway grade crossing in Queens, NY. When completed, this will be the first quiet zone at a railroad crossing on the LIRR system and within the entire state of New York. Mr. Farrell reviewed the FRA requirements and developed the signal design for installation of the necessary supplementary safety measures. He also co-coordinated the development of civil design requirements to improve vehicular and pedestrian traffic at the grade crossing. (2/09 - 3/10)

FTA Denver Regional Transportation District West Corridor PMO - Signal Specialist
Reviewed drawings and specifications for signals to support the Denver Regional Transportation District (RTD) West Corridor to make sure that FTA procedures and policies were followed. As part of the project management oversight (PMO) team, Mr. Farrell made recommendations to better design, install, and commission the new light rail transit (LRT) line, which will extend service from the existing Central Platte Valley light rail line at Auraria West Station in Denver to the Jefferson County Government Center in Golden, CO. (10/07 - 6/09)

SEPTA Broad Street Subway Signal System Upgrade - Signal Inspector
Provided inspection for the installation, testing, and commissioning of the signal system upgrade along 13 miles of the Broad Street Subway line, extending from the Southeastern Pennsylvania Transportation Authority (SEPTA) Fern Rock Yard to Pattison Station in Philadelphia. Systems include supervisory control and data acquisition (SCADA) system, computer terminals and software, microprocessors, switches, cable, and train stops. Mr. Farrell verified the quality of the installations and make certain that the signal systems interfaced with the traction power and communication systems as well as with the SEPTA main control center in downtown Philadelphia. (4/01 - 8/02)

Metra Interconnected Grade Crossings - Signals Design Review
Reviewed plans for quality and consistency for the upgrade of crossings with predictors to synchronize gate timing for maximum safety as part of the construction management phase of a $22 million grade crossing improvement program in northeastern Illinois. (9/00 - 3/01; construction completed: 2001)

PANYNJ PATH to Newark Liberty International Airport Connection - Signals Design Review
Reviewed 60% and 90% design submittals to verify quality and consistency of signal design, including the supervisory control and data acquisition (SCADA) system, for a Port Authority of New York and New Jersey (PANYNJ) feasibility study for a Port Authority Trans-Hudson (PATH) rail link from Manhattan to Newark Liberty International Airport in Newark, NJ. (2000)

Warren County Crossing Pre-Emption Project - Signals Design Review

Reviewed design submittals to verify quality and consistency of signal design, including the supervisory control and data acquisition (SCADA) system , and design of traffic pre-emption signals into operation of crossings for this project in Pittsburgh. (2000)

LIRR Main Line/Port Jefferson Divide Upgrade - Former Engineer, Signal Maintenance
Managed the upgrade of the signal system, including the supervisory control and data acquisition (SCADA) system, for the control of 50 to 60 miles of right-of-way (ROW) at the divide where the Long Island Rail Road (LIRR) Port Jefferson Branch splits off from the main line. This complex project encompassed several interlockings and required interface with the LIRR Traction Power, Track, and Operations departments. Mr. Farrell also coordinated this work with the upgrade of the LIRR supervisory system. (1998 - 2000)

Long Island Rail Road - Former Engineer, Signal Maintenance
Oversaw six maintenance subdivisions with more than 200 employees for the systemwide maintenance and repair of Long Island Rail Road (LIRR) signal systems, including supervisory control and data acquisition (SCADA) systems, encompassing more than 160 route miles of track and 296 highway crossings in New York City and Long Island. The repairs encompassed a wide range of conditions, including deteriorated cables, electrical equipment, crossing signals, and Federal Railroad Administration (FRA) testing. Mr. Farrell developed and managed a $13 million signal maintenance budget; monitored all project schedules; and developed, oversaw, and coordinated comprehensive safety programs with supervisors. He actively coordinated with the other LIRR departments, especially the Traction Power, Track, and Transportation departments, to bring about proper interface, minimize train delays, and coordinate construction. He reviewed claims and assisted the Labor Relations department with submissions to the board. He also screened and interviewed candidates for employment as assistant signalmen and signal helpers. (10/92 - 6/00)

Long Island Rail Road - Former Supervisor, Signal Construction
Supervised up to 40 employees on various signal construction projects throughout the Long Island Rail Road (LIRR) commuter rail system in New York City and Long Island, NY. Mr. Farrell developed schedules and man-loading for major projects. He researched and ordered materials and managed force account man-hours for major, multimillion-dollar projects. (1/86 - 10/92)

LIRR Harold Interlocking Upgrade - Former Supervisor, Signal Construction
Managed a staff of 65, including inspectors and foremen, for a comprehensive signal upgrade, including the supervisory control and data acquisition (SCADA) system, signals, switches, controls, and cable, at the Harold Interlocking in Queens, NY. Mr. Farrell coordinated with the Long Island Rail Road (LIRR) Traction Power, Track, and Operations departments, as well as with Amtrak, to bring about the proper interface of

all systems and to coordinate track shutdowns during construction. He managed this extremely fast-track project, which was commissioned over a 5-month period with minimum impact on train traffic, to meet all schedule, budget, quality, and safety requirements. The upgrade established state-of-the-art technology for the interlocking, which was effectively operating with 1940s technology. The interlocking consists of four main line tracks — two tracks from New Haven and two tracks from the Port Washington Branch — all feeding into four tracks for service to Manhattan. (5/90 - 9/90)

Long Island Rail Road - Former Assistant Foreman, Signal Department
Supervised up to eight employees for the planning and implementation of revisions to Long Island Rail Road (LIRR) signal systems. Mr. Farrell developed sequences of work and manpower placements for cut-in of new signal systems. He also operated the signal control trouble desk. (1/82 - 11/86)

LIRR Hall East Interlocking - Former Signal Supervisor, Signal Department
Supervised the installation of signal systems, including the supervisory control and data acquisition (SCADA) system, for the Hall East Interlocking in Jamaica, NY, which includes five crossovers and associated signals. Mr. Farrell supervised construction activities and interfaced the new electrical, all-relay interlocking with the existing, completely mechanical interlocking. Consisting of two main line tracks and two secondary tracks, the new interlocking provided flexibility to the existing Hall Interlocking and additional train routing during the Harold Interlocking upgrade. (1985)

Long Island Rail Road - Former Signal Maintainer/Inspector
Maintained, installed, and tested signal equipment for the Long Island Rail Road (LIRR). Mr. Farrell provided troubleshooting for various signal failures. (1/72 - 1/82)

TRANSPORTATION FACILITIES

LIRR Vanderbilt Permanent Rail Yard Design Review - Signal Specialist
Reviewing temporary and permanent design drawings and submittals at the 30%, 60%, 90%, and 100% level for the reconfiguration of the LIRR Vanderbilt Rail Yard along the Atlantic Branch in Brooklyn, NY. Mr. Farrell is reviewing and commenting on design submittals for signal and switch layouts as well as conduit and manhole composite plans. (3/10 - Present)

MBTA Redundant Operations Control Center Secure Stations - Signals Design Review
Reviewed, revised, and updated 60% and 90% submittals for the train control portion of a new Redundant Operations Control Center (ROCC) at an existing Massachusetts Bay Transportation Authority (MBTA) facility in Boston as part of a larger systemwide security program. The ROCC will operate independently from the existing Operations Control Center and will provide rapid transit line (RTL) dispatch capabilities for the Red, Orange,

Blue, Green, and Silver Lines, as well as a bus dispatch and alarm notification capability and MBTA Transit Police dispatch capability. Mr. Farrell incorporated comments, changes, and recommendations from MBTA staff into the final submittals to their satisfaction. (1/07 - 6/07)

BENTON V. FISHER

Mr. Fisher is Senior Managing Director in the Network Industries Strategies ("NIS") Group of FTI Consulting, specializing in the economic analysis of network industries, including railroad transportation. His business address is 1101 K Street, Suite B100, Washington, D.C. 20005. Mr. Fisher is sponsoring portions of Sections III-C and III-D related to certain operating expenses, but excluding General & Administrative and Maintenance of Way costs, of CSXT's Reply Evidence. Mr. Fisher has signed a verification of the truth of the statements contained therein. A copy of the verification is attached hereto.

Mr. Fisher is a graduate of Princeton University where he obtained a Bachelor of Science degree of Engineering, from the Civil Engineering and Operations Research department. He graduated with a concentration in Information and Decision Sciences, and also received a certificate for completing the requirements for the Engineering and Management Systems program. After graduating, Mr. Fisher served as the Deputy Controller for the U.S. Senate re-election campaign for Bill Bradley, and since April 1991 has been employed by FTI Consulting and Klick, Kent & Allen, an economic consulting firm that FTI Consulting acquired in 1998.

Much of the NIS group's work focuses on the economic and financial analysis of network industries, in particular different aspects of transportation. Mr. Fisher has spent more than 19 years involved in the analysis of rates, costs, and service, and the factors that affect them. In the rail industry, he has worked extensively to develop expert testimony before the Surface Transportation Board examining the reasonableness of railroad rates, railroads' applications for mergers and acquisitions, and rulemakings regarding the establishment, evaluation, revision, and implementation of rules and regulations. He has managed the development of expert testimony covering a variety of topics in numerous contract disputes in Federal court or Arbitration, requiring the analysis of economic and operating issues and response to service performance or other claims.

Much of Mr. Fisher's work for the railroad industry has required a detailed understanding of the regulations under which railroads operate, the rules by which rates are evaluated, and the costing approaches and models that are used. He has testified numerous times regarding stand-alone costs and URCS costs (Uniform Railroad Costing System, the STB's general purpose costing system) for individual movements, traffic groups, and entire networks. He has extensive experience with these costing approaches, including the detailed inputs and their sources, and the costing methodologies and formulae.

In addition to the rail industry, Mr. Fisher has been engaged with similar issues and disputes regarding the economic and financial analysis of telecommunications, postal, and energy matters. In those matters, as with rail, he has worked closely with detailed price, cost, and operational data and reviewed cost models and analyzed the sensitivity of multiple economic components, in evaluating rates, costs, and service in a variety of different contexts.

Mr. Fisher's complete curriculum vitae is attached.

VERIFICATION

I, Benton V. Fisher, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Benton V. Fisher

Benton V. Fisher

Executed on this 9 day of July 2014.

Benton V. Fisher

Senior Managing Director – Economic Consulting

benton.fisher@fticonsulting.com

FTI Consulting
1101 K Street, NW
Suite B100
Washington, DC 20005
Tel: (202) 312-9100
Fax: (202) 312-9101

Education
B.S. in Engineering and Management Systems, Princeton University

Benton V. Fisher is a Senior Managing Director of FTI's Economic Consulting group, located in Washington, D.C. Mr. Fisher has more than 20 years of experience in providing financial, economic and analytical consulting services to corporate clients dealing with transportation, telecommunications, and postal subjects.

North America's largest railroads have retained FTI both to assist them in making strategic and tactical decisions and to provide expert testimony in litigation. FTI's ability to present a thorough understanding of myriad competitive and regulatory factors has given its clients the necessary tools to implement and advance their business. Mr. Fisher has worked extensively to develop these clients' applications for mergers and acquisitions and expert testimony justifying the reasonableness of their rates before the Surface Transportation Board. In addition to analyzing extensive financial and operating data, Mr. Fisher has worked closely with people within many departments at the railroad as well as outside counsel to ensure that the railroads' presentations are accurate and defensible. Additionally, Mr. Fisher reviews the expert testimony of the railroads' opponents in these proceedings, and advises counsel on the necessary course of action to respond.

AT&T and MCI retained FTI to advance its efforts to implement the Telecommunications Act of 1996 in local exchange markets. Mr. Fisher was primarily responsible for reviewing the incumbent local exchange carriers' (ILEC) cost studies, which significantly impacted the ability of FTI's clients to access local markets. Mr. Fisher analyzed the sensitivity of multiple economic components and incorporated this information into various models being relied upon by the parties and regulators to determine the pricing of services. Mr. Fisher was also responsible for preparing testimony that critiqued alternative presentations.

Mr. Fisher assisted in reviewing the U.S. Postal Service's evidence and preparing expert testimony on behalf of interveners in Postal Rate and Fee Changes cases. He has also been retained by a large international consulting firm to provide statistical and econometric support in their preparation of a long-range implementation plan for improving telecommunications infrastructure in a European country.

Mr. Fisher has sponsored expert testimony in rate reasonableness proceedings before the Surface Transportation Board and in contract disputes in Federal Court and arbitration proceedings.

Mr. Fisher holds a B.S. in Engineering and Management Systems from Princeton University.

F T I
CONSULTING

CRITICAL THINKING
AT THE CRITICAL TIME

TESTIMONY

Surface Transportation Board

January 15, 1999	Docket No. 42022 FMC Corporation and FMC Wyoming Corporation v. Union Pacific Railroad Company, Opening Verified Statement of Christopher D. Kent and Benton V. Fisher
March 31, 1999	Docket No. 42022 FMC Corporation and FMC Wyoming Corporation v. Union Pacific Railroad Company, Reply Verified Statement of Christopher D. Kent and Benton V. Fisher
April 30, 1999	Docket No. 42022 FMC Corporation and FMC Wyoming Corporation v. Union Pacific Railroad Company, Rebuttal Verified Statement of Christopher D. Kent and Benton V. Fisher
July 15, 1999	Docket No. 42038 Minnesota Power, Inc. v. Duluth, Missabe and Iron Range Railway Company, Opening Verified Statement of Christopher D. Kent and Benton V. Fisher
August 30, 1999	Docket No. 42038 Minnesota Power, Inc. v. Duluth, Missabe and Iron Range Railway Company, Reply Verified Statement of Christopher D. Kent and Benton V. Fisher
September 28, 1999	Docket No. 42038 Minnesota Power, Inc. v. Duluth, Missabe and Iron Range Railway Company, Rebuttal Verified Statement of Christopher D. Kent and Benton V. Fisher
June 15, 2000	Docket No. 42051 Wisconsin Power and Light Company v. Union Pacific Railroad Company, Opening Verified Statement of Christopher D. Kent and Benton V. Fisher
August 14, 2000	Docket No. 42051 Wisconsin Power and Light Company v. Union Pacific Railroad Company, Reply Verified Statement of Christopher D. Kent and Benton V. Fisher
September 28, 2000	Docket No. 42051 Wisconsin Power and Light Company v. Union Pacific Railroad Company, Rebuttal Verified Statement of Christopher D. Kent and Benton V. Fisher
December 14, 2000	Docket No. 42054 PPL Montana, LLC v. The Burlington Northern Santa Fe Railway Company, Opening Verified Statement of Christopher D. Kent and Benton V. Fisher
March 13, 2001	Docket No. 42054 PPL Montana, LLC v. The Burlington Northern Santa Fe Railway Company, Reply Verified Statement of Christopher D. Kent and Benton V. Fisher
May 7, 2001	Docket No. 42054 PPL Montana, LLC v. The Burlington Northern Santa Fe Railway Company, Rebuttal Verified Statement of Christopher D. Kent and Benton V. Fisher

October 15, 2001	Docket No. 42056 Texas Municipal Power Agency v. The Burlington Northern Santa Fe Railway Company, Opening Verified Statement of Benton V. Fisher
January 15, 2002	Docket No. 42056 Texas Municipal Power Agency v. The Burlington Northern Santa Fe Railway Company, Reply Verified Statement of Benton V. Fisher
February 25, 2002	Docket No. 42056 Texas Municipal Power Agency v. The Burlington Northern Santa Fe Railway Company, Rebuttal Verified Statement of Benton V. Fisher
May 24, 2002	Docket No. 42069 Duke Energy Corporation v. Norfolk Southern Railway Company, Opening Evidence and Argument of Norfolk Southern Railway Company
June 10, 2002	Docket No. 42072 Carolina Power & Light Company v. Norfolk Southern Railway Company, Opening Evidence and Argument of Norfolk Southern Railway Company
July 19, 2002	Northern States Power Company Minnesota v. Union Pacific Railroad Company, Union Pacific's Opening Evidence
September 30, 2002	Docket No. 42069 Duke Energy Corporation v. Norfolk Southern Railway Company, Reply Evidence and Argument of Norfolk Southern Railway Company
October 4, 2002	Northern States Power Company Minnesota v. Union Pacific Railroad Company, Union Pacific's Reply Evidence
October 11, 2002	Docket No. 42072 Carolina Power & Light Company v. Norfolk Southern Railway Company, Reply Evidence and Argument of Norfolk Southern Railway Company
November 1, 2002	Northern States Power Company Minnesota v. Union Pacific Railroad Company, Union Pacific's Rebuttal Evidence
November 19, 2002	Docket No. 42069 Duke Energy Corporation v. Norfolk Southern Railway Company, Rebuttal Evidence and Argument of Norfolk Southern Railway Company
November 27, 2002	Docket No. 42072 Carolina Power & Light Company v. Norfolk Southern Railway Company, Rebuttal Evidence and Argument of Norfolk Southern Railway Company
January 10, 2003	Docket No. 42057 Public Service Company of Colorado D/B/A Xcel Energy v. The Burlington Northern and Santa Fe Railway Company, Opening Evidence and Argument of The Burlington Northern and Santa Fe Railway Company
February 7, 2003	Docket No. 42058 Arizona Electric Power Cooperative, Inc. v. The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad, Opening Evidence of The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad

April 4, 2003	Docket No. 42057 Public Service Company of Colorado D/B/A Xcel Energy v. The Burlington Northern and Santa Fe Railway Company, Reply Evidence and Argument of The Burlington Northern and Santa Fe Railway Company
May 19, 2003	Docket No. 42057 Public Service Company of Colorado D/B/A Xcel Energy v. The Burlington Northern and Santa Fe Railway Company, Rebuttal Evidence and Argument of The Burlington Northern and Santa Fe Railway Company
May 27, 2003	Docket No. 42058 Arizona Electric Power Cooperative, Inc. v. The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad, Joint Variable Cost Reply Evidence of The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad
May 27, 2003	Docket No. 42058 Arizona Electric Power Cooperative, Inc. v. The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad, Reply Evidence of The Burlington Northern and Santa Fe Railway Company
June 13, 2003	Docket No. 42071 Otter Tail Power Company v. The Burlington Northern and Santa Fe Railway Company, Opening Evidence of The Burlington Northern and Santa Fe Railway Company
July 3, 2003	Docket No. 42058 Arizona Electric Power Cooperative, Inc. v. The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad, Joint Variable Cost Rebuttal Evidence of The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad
October 8, 2003	Docket No. 42071 Otter Tail Power Company v. The Burlington Northern and Santa Fe Railway Company, Reply Evidence of The Burlington Northern and Santa Fe Railway Company
October 24, 2003	Docket No. 42069 Duke Energy Corporation v. Norfolk Southern Railway Company Supplemental Evidence of Norfolk Southern Railway Company
October 31, 2003	STB Docket No. 42069 Duke Energy Corporation v. Norfolk Southern Railway Company, Reply of Norfolk Southern Railway Company to Duke Energy Company's Supplemental Evidence
November 24, 2003	STB Docket No. 42072 Carolina Power & Light Company v. Norfolk Southern Railway Company, Supplemental Evidence of Norfolk Southern Railway Company
December 2, 2003	STB Docket No. 42072 Carolina Power & Light Company v. Norfolk Southern Railway Company, Reply of Norfolk Southern Railway Company to Carolina Power & Light Company's Supplemental Evidence
January 26, 2004	STB Docket No. 42058 Arizona Electric Power Cooperative, Inc. v. The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad Company, Joint Supplemental Reply Evidence and Argument of The Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad Company

March 1, 2004	STB Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. The Burlington Northern and Santa Fe Railway Company, Opening Evidence and Argument of The Burlington Northern and Santa Fe Railway Company
March 22, 2004	STB Docket No. 42071 Otter Tail Power Company v. The Burlington Northern and Santa Fe Railway Company, Supplemental Reply Evidence of The Burlington Northern and Santa Fe Railway Company
April 29, 2004	STB Docket No. 42071 Otter Tail Power Company v. The Burlington Northern and Santa Fe Railway Company, Rebuttal Evidence of The Burlington Northern and Santa Fe Railway Company
May 24, 2004	STB Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. The Burlington Northern and Santa Fe Railway Company, Reply Evidence of The Burlington Northern and Santa Fe Railway Company
March 1, 2005	Docket No. 42071 Otter Tail Power Company v. BNSF Railway Company, Supplemental Evidence of BNSF Railway Company
April 4, 2005	Docket No. 42071 Otter Tail Power Company v BNSF Railway Company, Reply of BNSF Railway Company to Supplemental Evidence
April 19, 2005	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Opening Evidence of BNSF Railway Company
July 20, 2005	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Reply Evidence of BNSF Railway Company
July 27, 2004	STB Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. The Burlington Northern and Santa Fe Railway Company, Rebuttal Evidence of The Burlington Northern and Santa Fe Railway Company
September 30, 2005	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Rebuttal Evidence of BNSF Railway Company
October 20, 2005	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Surrebuttal Evidence of BNSF Railway Company
June 15, 2006	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Reply Supplemental Evidence of BNSF Railway Company
June 15, 2006	Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. BNSF Railway Company, Reply Supplemental Evidence of BNSF Railway Company
March 19, 2007	Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. BNSF Railway Company, Reply Third Supplemental Evidence of BNSF Railway Company

March 26, 2007	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Reply Second Supplemental Evidence of BNSF Railway Company
July 30, 2007	Docket No. 42095 Kansas City Power & Light v. Union Pacific Railroad Company, Union Pacific's Opening Evidence
August 20, 2007	Docket No. 42095 Kansas City Power & Light v. Union Pacific Railroad Company, Union Pacific's Reply Evidence
February 4, 2008	Docket No. 42099 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Opening Evidence of CSXT
February 4, 2008	Docket No. 42100 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Opening Evidence of CSXT
February 4, 2008	Docket No. 42101 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Opening Evidence of CSXT
March 5, 2008	Docket No. 42099 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Reply Evidence of CSXT
March 5, 2008	Docket No. 42100 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Reply Evidence of CSXT
March 5, 2008	Docket No. 42101 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Reply Evidence of CSXT
April 4, 2008	Docket No. 42099 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Rebuttal Evidence of CSXT
April 4, 2008	Docket No. 42100 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Rebuttal Evidence of CSXT
April 4, 2008	Docket No. 42101 E.I. DuPont De Nemours and Company v. CSX Transportation, Inc., Rebuttal Evidence of CSXT
July 14, 2008	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Third Supplemental Reply Evidence of BNSF Railway Company
August 8, 2008	Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. BNSF Railway Company, Fourth Supplemental Evidence of BNSF Railway Company
September 5, 2008	Docket No. 41191 (Sub-No. 1) AEP Texas North Company v. BNSF Railway Company, Fourth Supplemental Reply Evidence of BNSF Railway Company
October 17, 2008	Docket No. 42110 Seminole Electric Cooperative, Inc. v. CSX Transportation, Inc., CSX Transportation, Inc.'s Reply to Petition for Injunctive Relief, Verified Statement of Benton V. Fisher
August 24, 2009	Docket No. 42114 US Magnesium, L.L.C. v. Union Pacific Railroad Company, Opening Evidence of Union Pacific Railroad Company

September 22, 2009	Docket No. 42114 US Magnesium, L.L.C. v. Union Pacific Railroad Company, Reply Evidence of Union Pacific Railroad Company
October 22, 2009	Docket No. 42114 US Magnesium, L.L.C. v. Union Pacific Railroad Company, Rebuttal Evidence of Union Pacific Railroad Company
January 19, 2010	Docket No. 42110 Seminole Electric Cooperative, Inc. v. CSX Transportation, Inc., Reply Evidence of CSX Transportation, Inc.
May 7, 2010	Docket No. 42113 Arizona Electric Power Cooperative, Inc. v. BNSF Railway Company and Union Pacific Railroad Company, Joint Reply Evidence of BNSF Railway Company and Union Pacific Railroad Company
October 1, 2010	Docket No. 42121 Total Petrochemicals USA, Inc. v. CSX Transportation, Inc., Motion for Expedited Determination of Jurisdiction Over Challenged Rates, Verified Statement of Benton V. Fisher
November 22, 2010	Docket No. 42088 Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. BNSF Railway Company, Comments of BNSF Railway Company on Remand, Joint Verified Statement of Michael R. Baranowski and Benton V. Fisher
January 6, 2011	Docket No. 42056 Texas Municipal Power Agency v. BNSF Railway Company, BNSF Reply to TMPA Petition for Enforcement of Decision, Joint Verified Statement of Michael R. Baranowski and Benton V. Fisher
July 5, 2011	Docket No. 42123 M&G Polymers USA, LLC v. CSX Transportation, Inc., Reply Market Dominance Evidence of CSX Transportation, Inc.
August 1, 2011	Docket No. 42125 E.I. DuPont De Nemours and Company v. Norfolk Southern Railway Company, Norfolk Southern Railway's Reply to Second Motion to Compel, Joint Verified Statement of Benton V. Fisher and Michael Matelis
August 5, 2011	Docket No. 42121 Total Petrochemicals USA, Inc. v. CSX Transportation, Inc. , Reply Market Dominance Evidence of CSX Transportation, Inc.
August 15, 2011	Docket No. 42124 State of Montana v. BNSF Railway Company, BNSF Railway Company's Reply Evidence and Argument, Verified Statement of Benton V. Fisher
October 24, 2011	Docket No. 42120 Cargill, Inc. v. BNSF Railway Company, BNSF Railway Company's Reply Evidence and Argument, Verified Statement of Benton V. Fisher
October 28, 2011	Docket No. FD 35506 Western Coal Traffic League - Petition for Declaratory Order, Opening Evidence of BNSF Railway Company, Joint Verified Statement of Michael R. Baranowski and Benton V. Fisher
November 10, 2011	Docket No. 42127 Intermountain Power Agency v. Union Pacific Railroad Company, Reply Evidence of Union Pacific Railroad Company
November 28, 2011	Docket No. FD 35506 Western Coal Traffic League - Petition for Declaratory Order, Reply Evidence of BNSF Railway Company, Joint Reply Verified Statement of Michael R. Baranowski and Benton V. Fisher

December 14, 2011	Docket No. 42132 Canexus Chemicals Canada L.P. v. BNSF Railway Company, BNSF Motion to Permit Consideration of 2011 TIH Movements from BNSF Traffic Data in Selecting Comparison Group, Verified Statement of Benton V. Fisher
February 13, 2012	Docket No. 42132 Canexus Chemicals Canada L.P. v. BNSF Railway Company, Opening Evidence of BNSF Railway Company, Verified Statement of Benton V. Fisher
March 13, 2012	Docket No. 42132 Canexus Chemicals Canada L.P. v. BNSF Railway Company, Reply Evidence of BNSF Railway Company
April 12, 2012	Docket No. 42132 Canexus Chemicals Canada L.P. v. BNSF Railway Company, Rebuttal Evidence of BNSF Railway Company
May 10, 2012	Docket No. 42056 Texas Municipal Power Agency v. BNSF Railway Company, BNSF Reply to TMPA Petition to Reopen and Modify Rate Prescription, Joint Verified Statement of Michael R. Baranowski and Benton V. Fisher

U.S. District Court for the Eastern District of North Carolina

March 17, 2006	Civil Action No. 4:05-CV-55-D, PCS Phosphate Company v. Norfolk Southern Corporation and Norfolk Southern Railway Company, Report by Benton V. Fisher

U.S. District Court for the Eastern District of California

January 18, 2010	E.D. Cal. Case No. 08-CV-1086-AWI, BNSF Railway Company v. San Joaquin Valley Railroad Co., et al.

Arbitrations and Mediations

July 10, 2009	JAMS Ref. # 1220039135; In the Matter of the Arbitration Between Pacer International, Inc., d/b/a/ Pacer Stacktrain (f/k/a/ APL Land Transport Services, Inc.), American President Lines, Ltd. And APL Co. Pte. Ltd. And Union Pacific Railroad Company; Rebuttal Expert Report of Benton V. Fisher

ROB FISHER

Mr. Fisher is a Senior Director – Economic Consulting in the Network Industries Strategies ("NIS") Group of FTI Consulting, Inc., specializing in the economic analysis of network industries, including railroad transportation. His business address is 1101 K Street, Suite B100, Washington, D.C. 20005. Mr. Fisher is sponsoring portions of Sections III-A (including the calculations of volumes and revenues for the SARR traffic group), III-G, and III-H of CSXT's Reply Evidence. Mr. Fisher has signed a verification of the truth of the statements contained therein. A copy of the verification is attached hereto.

Mr. Fisher earned his Bachelor of Science from Georgetown University and his Master of Business Administration from the University of Michigan. Mr. Fisher spent ten years as a strategy consultant, working for dozens of telecommunications firms on financial analysis, marketing strategy and operational improvement.

At FTI, Mr. Fisher has provided financial and economic consulting services to the transportation, energy and telecommunications industries. Mr. Fisher has participated in multiple Stand-Alone Cost rate cases before the Surface Transportation Board, including providing testimony.

Mr. Fisher's complete curriculum vitae is attached.

VERIFICATION

I, Rob Fisher, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Rob Fisher

Rob Fisher

Executed on this 21 day of July 2014.

Rob Fisher

Senior Director – Economic Consulting

Robert.Fisher@fticonsulting.com

FTI Consulting
1101 K Street, NW
Suite B100
Washington, DC 20005
Tel: (202) 312-9100
Fax: (202) 312-9101

Education
MBA (with distinction) from University of Michigan

BS from School of Foreign Service at Georgetown University

Rob Fisher is a senior director in the Network Industries Strategies group of the FTI Economic Consulting practice and is based in Washington, D.C. Mr. Fisher provides financial and economic consulting services to the transportation, energy and telecommunications industries.

Mr. Fisher has developed expert testimony for railroad clients in litigation disputes involving the delivery of large coal shipments to energy customers. He also has directed financial analysis to demonstrate the reasonableness of railroad rates before the Surface Transportation Board, including leading the analysis for the first small-shipper case before the Board.

In addition, Mr. Fisher has supported a consortium of manufacturers to gain anti-leakage provisions in the pending greenhouse gas legislation. His report, which measured the energy and trade intensity and the emissions of each industry, has been entered into Congressional testimony.

Prior to joining FTI, Mr. Fisher worked for two technology companies, most recently as Vice President of Strategic Marketing, where he held P&L responsibility for the company's largest product. Before that, he spent 10 years as a strategy consultant, working with dozens of telecom clients on financial analysis, marketing strategy and operational improvement.

Mr. Fisher holds an M.B.A. (with distinction) from the University of Michigan and a B.S. from the School of Foreign Service at Georgetown University.

TESTIMONY

Surface Transportation Board

May 7, 2010	Docket No. 42113 Arizona Electric Power Cooperative, Inc. v. BNSF Railway Company and Union Pacific Railroad Company, Joint Reply Evidence of BNSF Railway Company and Union Pacific Railroad Company
November 10, 2011	Docket No. 42127 Intermountain Power Agency v. Union Pacific Railroad Company, Reply Evidence of Union Pacific Railroad Company
September 24, 2012	Docket No. 42130 SunBelt Chlor Alkali Partnership v. Norfolk Southern Railway Company, Norfolk Southern Railway Company's Motion to Hold Case in Abeyance Pending Completion of Rulemaking, Verified Statement of Robert O. Fisher

RANDALL G. FREDERICK

Mr. Frederick is a Project Manager/Senior Engineer/Associate with STV Inc., a professional firm offering engineering, architectural, planning, environmental, and construction management services with offices at 5200 Belfort Road, Suite 400, Jacksonville, Florida 32256. Mr. Frederick has more than 30 years of experience as a project manager and senior engineer managing underground wireline and pipeline utility installations and construction engineering and inspection ("CE&I") services for highway and railway bridges and tunnels. Mr. Frederick is sponsoring portions of Section III-F of CSXT's Reply Evidence relating to Public Improvements. Mr. Frederick has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

As a former CSX Principal Engineer, Mr. Frederick functioned as the primary representative in the mediation of legal proceedings, public safety issues, and other politically sensitive railroad-related matters. He managed the system and network of the company's Computer Aided Dispatching System ("CADS"), Rail-Highway Grade Crossing Warning Systems, and Incremental Train Control Signaling ("ITCS"). Mr. Frederick holds a Bachelor of Arts degree in business administration from Cedarville University.

Mr. Frederick's complete curriculum vitae is attached.

VERIFICATION

I, Randall G. Frederick, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Randall G. Frederick

Executed on this 16th day of July 2014.

Randall G. Frederick

Project Manager/Senior Engineer
Associate

Mr. Frederick, the office manager for STV's office in Jacksonville, FL, has more than 35 years of experience as a project manager providing construction engineering and inspection (CE&I) services for highway and railway bridges and tunnels. As a former CSX Principal Engineer, he was responsible for management and administration of publicly funded projects in Ohio, Pennsylvania, West Virginia, Virginia, Maryland, and Washington, D.C. Mr. Frederick functioned as the primary representative in the mediation of legal proceedings, public safety issues, and other politically-sensitive railroad-related matters. He managed the system and network of the company's Computer Aided Dispatching System (CADS), and provided guidance for Rail-Highway Grade Crossing Warning System designs and other publicly funded projects.

Office Location
Jacksonville, FL

Date joined firm
9/12/05

Years with other firms
30

Education
Bachelor of Arts, Business Administration; Cedarville University (1987)

Training
FRA Roadway Worker

Environmental and Industrial Safety Course

AREMA Highway Crossing Interconnection

Memberships
NCUTCD Railroad & Light Rail Transit Highway Grade Crossings Technical Committee

Computer Skills
MS PowerPoint, MS Project, MS Access

Project Experience

RAIL

CSX I-370 Bridge Widenings - Construction Manager
Managing CE&I services for the widening of dual highway bridges on I-370 over the CSX right-of-way in Derwood, MD. Mr. Frederick is preparing estimates, coordinating with CSX personnel, and managing the budget. (2006 - Present)

CSX Public Projects GEC Management – Project Manager
Supervising the engineering review, administrative and contract handling, and estimate preparation for third-party overhead bridge and at-grade crossing projects. Mr. Frederick is responsible for ensuring strict compliance with CSX criteria, specifications, and standards. His responsibilities include reviewing CSX operating requirements, railroad force account development, contract management, construction management, and project budget oversight. (2005 – Present)

CSX Wireline and Pipeline Installations - Construction Manager
Managing multiple underground wireline and pipeline utility installations across CSX property in 23 states, some of which go under and others parallel to the CSX right-of-way. Mr. Frederick is preparing estimates, coordinating with CSX personnel, and managing the project budgets. (2005 - Present)

CSX Railroad Bridge over Asbury Road Rehabilitation - Project Manager
Managing preliminary engineering reviews and development of railroad force account estimates and contract management for the rehabilitation of a

single-span railroad bridge over Asbury Road at Erie International Airport in Erie, PA. Mr. Frederick coordinated with CSX personnel and managed the budget until the project was cancelled. (2006 - 2012)

CSX Montgomery Sanitary Sewer Installation - Project Manager
Managed CE&I services for the micro-tunneling and installation of a 96-foot sanitary sewer beneath the CSX main line tracks in Montgomery, AL. Mr. Frederick prepared estimates, coordinated with CSX personnel, and managed the budget. (2007 – 2008)

Republic of China Ministry of Rail ITCS Signal System - Designer
Served as a member of the design management team for a state-of-the-art, GPS-based, ITCS system on 1,400 km of rail line between Beijing and Tibet for the Republic of China's Ministry of Rail. Mr. Frederick led a team of engineers and CAD designers in the application engineering department of GE Transportation Systems in Jacksonville, FL, to ensure on-time project completion within pre-established budgetary constraints. (2004 - 2005) Performed while employed by GE Transportation Systems.

GE Transportation Systems - Signal Engineer
Directed oversight and management of the grade crossing warning system and as-in-service train control projects. This position required solid knowledge and experience in railroad signal design; inspection and installation; Federal Railroad Administration, Federal Highway Administration, and Manual on Uniform Traffic Control Devices standards; as well as a thorough understanding of the federal (ISTEA/TEA-21/SAFETEA-LU) funding programs. (2000 - 2005)

CSX Public Projects - Former Principal Engineer, Public Projects
Oversaw project management and administration of publicly funded projects, within a 11-state area including Ohio, Michigan, Indiana, Illinois, Pennsylvania, Kentucky, Tennessee, West Virginia, Virginia, Maryland, Washington, D.C., and Ontario, Canada. Mr. Frederick monitored, scheduled, and coordinated key project milestones necessary for successful implementation. His responsibilities necessitated close interaction, communication, and negotiation with state and local government authorities for review and execution of contractual agreements. The position required detailed knowledge and application of state and federal laws and regulations, as they relate to railroad operations, permitting, and associated issues. He periodically appeared as the railroad's expert witness for grade crossing accident and Public Utility Commission hearings and litigation. Mr. Frederick also functioned as the railroad's primary representative in the mediation of legal proceedings, public safety issues, and other politically-sensitive railroad-related matters. (1994 - 2000)

CSX Technology - Former Software Engineer
Managed the system and network of the company's CADS in Jacksonville, FL. His duties included system monitoring, performance tuning, supervision, implementation and management of software/hardware upgrades, and

disaster recovery planning within a high-volume, mission-critical operation. (1992 - 1994)

CSX Technology - Former Electronic Signal Technician
Coordinated and implemented new software to update CADS in Jacksonville, FL. His duties included managing and directing field personnel in the identification, analysis, and resolution of signal code system problems. (1988 - 1992)

CSX Technology - Former Division Signal Maintainer
Performed signal design, installation, maintenance, and electronic trouble shooting of automatic signal and grade crossing warning systems in Newark, OH. (1974 - 1988)

JOHN GIBSON

Mr. Gibson is the Principal at PC&N Consulting. Mr. Gibsons's office is located at 4431 Harbour Island Dr., Jacksonville, Florida 32225. Mr. Gibson is sponsoring the operating plan described in Section III-C of CSXT's Reply Evidence. A copy of his verification is attached hereto.

Mr. Gibson holds a Masters of Business Administration from American University with a specialty in Finance as well as a Bachelor of Arts from the University of Maryland. Mr. Gibson has over twenty years of railroad experience and was employed by CSX Transportation between 1994 and 2009. Mr. Gibson served as CSXT Vice President – Operations Research and Planning between 2004 and 2009 during which he oversaw operations research and planning, including the development of an annual capacity capital plan, and the creation of capacity investment strategies to improve network fluidity. Mr. Gibson served as Assistant Vice President – Operations Planning between 1996 and 2004. During his fifteen years at CSXT, Mr. Gibson was responsible for managing CSXT's passenger operations, passenger and joint facility agreements, and office car departments. He also oversaw CSXT's strategic planning and contract negotiations. Beginning in 2009, Mr. Gibson joined PC&N Consulting. At PC&N, Mr. Gibson provides advice for rail management, capacity simulation modeling, and rail strategic planning.

Mr. Gibson's curriculum vitae is attached.

VERIFICATION

I, John Gibson, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

John Gibson

Executed on this 7th day of July 2014.

John M. Gibson, Jr.
Principal
PC&N Consulting
4431 Harbour Island Dr.
Jacksonville, Fl. 32225
Cell 904-607-2785
pcnconsulting@comcast.net

Summary:

- Rail management veteran with 31 years of progressive achievement
- Skilled negotiator with more than $2 billion in successful transactions
- Experienced speaker in all venues including: senior management, press interviews, litigation, Surface Transportation Board proceedings and Congressional hearings
- Managed CSX Transportation's (CSX) Operations Research, Operations Planning, Passenger Operations, Passenger and Joint Facility Agreements, and Office Car Departments
- Oversaw CSX's passenger operations, strategic planning and contract negotiations

Employment History:

Principal – PC&N Consulting

- Full range of duties for this small consulting firm which provides advice for rail management, passenger startups, capacity simulation modeling, business practice reviews and strategic planning

CSX Vice President Operations Research & Planning (2004 – 2009)

- Full control of 45 person department with an operating budget exceeding $5 million per year. Direct reports included:
    - Operations Research – performed traditional operating research functions including optimization modeling, new tool

development, regulation analysis and implementation, and measurement of network efficiency. Led industry efforts to insure compliance with new Toxic Inhalation Hazard regulations.

- Operations Planning – developed annual capacity capital plan totaling up to $150 million per year, created capacity investment strategies to improve network fluidity and created network and corridor models to evaluate the effectiveness of proposed capacity investments.
- Passenger and Joint Facilities Agreements – oversaw the negotiation and implementation of more than 1,500 joint facility agreements and all passenger agreements including Amtrak, MBTA, Metro North, SEPTA, MARC, VRE and TriRail.
- Amtrak and Commuter Operations – oversaw 24/7 operations desk, provided tactical guidance to recover from service delays, lead strategic efforts to improve on time performance and to improve processes for creating passenger operating schedules.
- Office Car Operations – managed operation of CSX's historic office car fleet for transportation, political, customer and charity events. Acquired, rehabilitated and retired equipments as appropriate. Operated 11 years injury free.

Assistant Vice President Operations Planning (1996 – 2004

- Responsible for CSX's capacity capital budget, simulation modeling efforts and proposals to increase or introduce passenger service on CSX territory.

Director Business Development (1994 – 1995)

- Directed strategic acquisitions including investments in the Pittsburgh & Lake Erie, Paducah & Louisville, Pittsburgh & Ohio Valley and the Indiana Railroads.

President Three Rivers Railroad (1993 – 1994)

- Full range operating control of CSX Subsidiary after acquisition of assets from the Pittsburgh & Lake Erie Railroad. Employees included Sales and Marketing, Accounting, Transportation and Engineering supervision and 50 contract employees.

Manager/Director Shortline Sales (1983 – 1992)

- Negotiated and closed more than 100 transactions.

Financial Analyst/Manager/Director (1978 – 1983)

- Represented the Federal Railroad Administration in negotiations for preference share and loan purchases to U.S. railroads.

Education:

- BA University of Maryland with 2 majors: Economics and Public administration-1983
- MBA American University specializing in Finance-1986

Affiliations:

- 2011 – 2013 Jacksonville Public Library Board of Trustees
- 2010 – 2013 Children's Home Society
- 1999 – 2009 Habitat for Humanity of Jacksonville, FL. Board of Directors, former Chairman, Vice Chairman, various committee chairs
- 2005 – 2009 United Way of Northeast Florida. Campaign Board, CSX Campaign Co-Chair.

ROBERTO J. GUARDIA

Mr. Guardia is a Vice President with Shannon & Wilson, Inc., a consulting firm dedicated to providing a full range of geotechnical and environmental engineering services located at 13400 Sutton Park Drive South, Suite 1401, Jacksonville, Florida 32224. Mr. Guardia is a geotechnical engineer with 25 years of experience including the last 18 years in tunneling, microtunneling and horizontal directional drilling projects. Mr. Guardia is sponsoring portions of Section III-F of CSXT's Reply Evidence relating to Tunnels. Mr. Guardia has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Guardia has been involved in the construction and rehabilitation of over 150 tunnels in the U.S. and overseas. Other areas of expertise include tunnel support, grouting, and shotcrete. He has been Resident Engineer for the enlargement of approximately 25 railroad tunnels. Mr. Guardia has served as Project Manager for the design and plans and specifications for construction, enlargement and rehabilitation of railroad, highway and conveyance tunnels. Mr. Guardia has both a Bachelor of Science degree in civil engineering and a Master of Science degree in (geotechnical) civil engineering from the University of Illinois.

Mr. Guardia's complete curriculum vitae is attached.

VERIFICATION

I, Roberto J. Guardia, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

RJ Guardia
Roberto J. Guardia

Executed on this 10TH day of July 2014.

Roberto J. Guardia, PE | Vice President

GEOTECHNICAL ENGINEER

EDUCATION

MS, (Geotechnical) Civil Engineering, University of Illinois, 1978
BS, Civil Engineering, University of Illinois, 1976

REGISTRATION

Professional Engineer, Washington, 26086, 1989
Professional Engineer, Oregon, 66833PE, 2001
Professional Engineer, California, C63333, 2002
Professional Engineer, Florida, 63761, 2006
Professional Engineer, Georgia, PE032289, 2007
Professional Engineer, Alabama, 30515
Professional Engineer, South Carolina, 27552
Professional Engineer, Panama, 81-006-053, 1981
Approved Examiner and Trainer for American Concrete Institute Shotcrete Nozzlemen Certification

ADDITIONAL TRAINING

Health and Safety Training for Hazardous Waste Operations (40-Hour 29 CFR, 1910.120)
Short Course - Applied Rock Mechanics, ASCE, 1998
Short Course – Deep Foundations, Deep Foundation Institute, 1993
Short Course – Mechanical Excavation and Ground Support, Colorado School of Mines, 1994
Short Course- Project Delivery System, Transpeed, 2001
Various Short Courses organized by the Seattle Section of ASCE

Roberto Guardia is a geotechnical engineer with 25 years of experience including the last 18 years in tunneling, microtunneling and horizontal directional drilling projects. Roberto has been involved in the construction and rehabilitation of over 150 tunnels in the US and overseas. Other areas of expertise include tunnel support, grouting, and shotcrete. He has been Resident Engineer for the enlargement of approximately 25 railroad tunnels. Mr. Guardia has served as Project Manager for the design and plans and specifications for construction, enlargement and rehabilitation of railroad, highway and conveyance tunnels including the Elk Creek, Cape Creek and Edwards Tunnels for ODOT.

Microtunneling

Health Ministry/ Nippon Koei, Panama, Sewer Collection Tunnel, Panama City, Panama. As Project Geotechnical Manager, Roberto provided Geotechnical services for the 8-kilometer 3.0-meter diameter sewer collector tunnel. The first phase of exploration included 22 deep borings up to 40 meters deep in soil and rock and a preliminary engineering report of conditions encountered and recommendations for design and tunneling machine selection. The rock samples were characterized by performing unconfined compressive strength tests, tri-axial tests, point load tests and slake durability tests. In-place permeability tests were performed at the bottom of the boreholes utilizing packer tests. The second phase included 42 deep borings to further explore difficult areas and included the preparation of tunneling specifications and a Geotechnical

Baseline Report for the Design-Build project. Tunneling machine is an earth pressure balance tunneling machine and support provided with a segmental concrete lining.

King County, Henderson Combined Sewer Overflow (CSO), Seattle, Washington. A 1,000-foot segment of the project consisted of a 72-inch-diameter concrete pipe that was installed by microtunneling under an eight-lane section of Interstate-5 and the BNSF and Union Pacific Railroad corridor into Seattle. Three-dimensional tomography methods were utilized to identify potential obstructions. Horizontal directional drilling was used to install three 4 ½-inch high-density polyethylene (HDPE) pipes around the future tunnel to run the tomography probes. Roberto managed the exploration program, prepared a geotechnical baseline report, and plans and specifications related to the 72-inch crossing. Obstructions found during tunneling confirmed the anticipated obstructions identified by the three-dimensional tomography.

King County, Henderson Combined Sewer Overflow (CSO), Seattle, Washington. Roberto was Project Manager assisting Construction Management Team in reviewing geotechnical related submittals, weekly progress meetings, assessing construction methods, special inspections for shotcrete supported circular shafts and monitoring and analyzing ground behavior while tunneling under two important water mains. The 3,500-foot-long, 15-foot diameter storage tunnel was excavated with an earth pressure balance machine and supported with gasketed segmental liner. Compaction grouting was utilized for an area of excessive ground settlement and as a precautionary measure under the main waterlines. Five microtunnels ranging from 48- to 78-inch-diameter and up to 750 feet long were part of the project connecting between shafts.

Bonneville Power Administration, Pipe Jacking, Vancouver, Washington. As Project Engineer, Roberto provided design and plans and specifications for the construction of a 48-inch pipe jack to replace an existing distressed concrete pipe at the Cold Creek diversion pipeline of the Bonneville Power Administration in Vancouver. The design-construct contract was structured to allow concrete, fiberglass, and steel pipe as alternates. A Data Report and a Baseline Report were provided as part of the project documents. Lateral loads were provided for the design of three shafts up to 80 feet deep connecting the three segments of the 2,250 feet long pipeline. Provided Engineer's cost estimate, submittal review, and overseeing construction activities with participation in progress meetings as required. A slurry excavation microtunneling machine and a closed shield machine were used simultaneously in different segments.

Burns & McDonnell, Lake Ft. Smith Water Supply Intake Works, Fort Smith, Arkansas. The water supply intake structures consisted of an intake tower built in a shaft on the shore of Lake Ft. Smith, a 1,300 feet long multi-use tunnel and outlet portal structure. The shaft and tunnel were excavated by drill and blast methods and supported by steel fiber reinforced shotcrete and rock dowels. The tunnel was lined with cast-in-place concrete and will be used for flood control discharge. There are two water supply pipes below the invert of the tunnel. Two lake taps of 72-inch-diameter and 300 feet aggregate length were excavated from the intake shaft below lake level utilizing microtunneling methods. Roberto served as Project Manager/Designer for this project preparing plans and specifications.

Cascade Water Alliance, Waterline Central Segment, Seattle, Washington The Cascade Water Alliance, composed by several utilities and cities of eastern Seattle are building a new 42-inch diameter waterline to meet the needs of the growing east side communities. The 10-mile long Central segment has four undercrossings that will be excavated by microtunneling methods installing 48 to 56-inch diameter casings. Obstacles include a BNSF railroad line/ Jenkins Creek, four-lane with median SR-18, Little Soos Creek and a major avenue Kent-Kangley Road. Roberto was Project Manager for the exploration consisting of eight borings and Geotechnical recommendations for the new crossings with lengths between 135 to 355 feet utilizing microtunneling methods. Slug tests in cased boreholes were conducted to estimate the groundwater inflow during dewatering of the alluvial deposits at Jenkins Creek. Both slurry pressure balanced and auger microtunneling methods were recommended. Recommendations were provided for shafts, thrust blocks and construction dewatering.

City of Seattle Duwamish River Crossing, Seattle, Washington. As Project Engineer, Roberto provided submittal reviews for two 80-foot-deep frozen ground shafts and 10-foot-diameter concrete pipes installed by pipe-jacking with a slurry-circulation microtunneling machine. The 540-foot-long crossing traversed saturated silts and fine sands. Participated in construction monitoring during the difficult shaft construction due to freeze-pipe complications and evaluated instrumentation including inclinometer/magnetic switch extensometers, piezometers, and thermistor strings.

City of Everett, I-5 Crossing, Everett, Washington. Roberto was Project Engineer for a 60-inch steel pipe jacked under I-5 near Everett. Provided construction monitoring during chemical grouting of the heading material consisting of soft organic soils and hydraulically placed fill. Performed cube compression test on grouted sand samples. The pipe was jacked with an open face shield and spoils removed with an auger.

City of Kennewick, Kennewick Treatment Plant, Kennewick, Washington. Roberto was Project Engineer for the design, plans, and specifications for 10-foot-diameter jacked steel pipe crossing a BNSF mainline embankment. Also provided the engineer's cost estimate and lateral pressures for the design of the reaction shoring. The 160 feet long pipe jack will be used to convey a 2-foot-diameter treated sewer line and pedestrian traffic.

BNSF, Pipe Jacking, Tacoma, Washington. As Project Engineer, Roberto reviewed submittals and provided partial construction monitoring for a 540-foot-long, 68-inch-diameter steel pipe jacked under a BNSF railyard in Tacoma. The tunnel was driven with a slurry microtunneling machine excavating through consolidated silts, sands, and clays with the ground water located 3 feet below the ground surface. Logs were encountered in the course of the excavation, which were crushed by the slurry machine. The project was completed without significantly disturbing the railyard tracks as verified by survey settlement points.

Tunnels

CSX Transportation, National Gateway Initiative Project, Pennsylvania, West Virginia and Maryland. Roberto served as Project Manager for the National Gateway Project that included double-stack container clearance improvements for seven tunnels in Phase 1 of the project. Roberto coordinated the work of three full time Tunnel Resident Engineers and other rotating staff providing Construction Management services. Clearance improvement work included notching of concrete and brick liners and removal and replacement of existing brick liners with shotcrete and rock dowels or steel sets.

Oregon Department of Transportation, In-Depth Tunnel Inspections, Oregon. As Project Manager, Roberto performed in-depth tunnel inspections of nine highway tunnels in Oregon and provided tunnel inspection training to their engineering and maintenance personnel. The inspection reports had detailed information regarding tunnel design and detailed tunnel maps. Tunnel portals, adjacent slopes, and tunnel drainage systems were also evaluated during the tunnel inspections. Recommendations were provided for immediate, short-term and long-term maintenance and the scope and budget of the anticipated repairs. A tunnel inspection training manual was prepared with basic tunnel design concepts, descriptions of tunnel liners, and specific tunnel inspection procedures adapted to each kind of tunnel liner. One-day and half-day long training seminars were developed for engineering and maintenance personnel respectively. The seminars included examples of liner distress for various kinds of liners, as identified during the tunnel inspections, and discussion of tunnel maintenance and rehabilitation recommendations for each tunnel.

Washington State Department of Transportation, Interstate 90 Tunnel Feasibility, Hyak, Washington. Roberto was Project Manager for the feasibility study and preliminary cost estimate for the 3,000-feet long, 36-foot wide roadway twin tunnels through volcanic and sedimentary rocks. Geologic reconnaissance of the portals and terrain over the tunnel alignment provided basic geologic information that was used in the preliminary rock support design. The preliminary design of the 190 foot high west portal rock cut was developed based on existing topography and existing highway constraints. An engineer's cost estimate was developed for construction of the tunnel and portals based on unit costs and estimated quantities. A geotechnical exploration program for final design including core drilling along the alignment and portals and the use of the boring optical televiewer and a pilot bore along the tunnel alignment was developed.

Oregon Department of Transportation, Cape Creek Tunnel Rehabilitation, Florence, Oregon. Roberto was Project Manager for the geotechnical investigation, testing, design, plans, specifications, and construction observation for Cape Creek Tunnel Rehabilitation. The 714-foot-long tunnel built in 1933 has approximately 450 feet of timber lining that was later covered with a reinforced concrete lining. The rest of the tunnel was left unlined. Geotechnical investigations included drill probes through the concrete lining and six coreholes drilled through the arch form within the tunnel to a depth of 25 feet. The concrete linings were also tested with ground penetration radar and sonic testing to determine the strength and thickness of the lining, and to get an indication of loose rock and voids above the lining. The investigation found that a segment of the concrete lining had areas of thinner concrete and signs of distress and corrosion with high rock loading. The lining near the south portal was designed for replacement with lattice girders and shotcrete and cement grouting in the tunnel arch. The rest of the concrete linings will be backfilled with lightweight grout to fill the existing voids. The unlined areas will be supported with rock bolts and shotcrete.

Union Pacific, Clearance Improvements for Double-Stack Cars of Coos Bay Tunnels, Oregon. Roberto is Project Manager for the ongoing evaluation of 9 tunnels in the Coos Bay area to determine preliminary feasibility and construction costs for providing double-stack container car clearance. The condition of the tunnels was assessed and surveyed cross-sections were evaluated to determine the depth of tunnel clearance required by location. Concrete notching, complete timber set removal with new tunnel support and track lowering are under consideration to obtain the clearance improvements.

RailAmerica, Tunnel 13, Siskiyou, Oregon. Tunnel 13 had extensive damage due to a fire and after rehabilitation there were two segments of the tunnel that did not meet State requirements for vertical and side clearance. Roberto was Project Manager for determining the impediments by laser survey and developing the design and specifications for the tunnel clearance improvements. Existing steel sets had to be removed and replaced with new steel sets located in a new centerline. The work involved the use of steel fiber reinforced shotcrete, steel dowels and new steel sets. We also participated during construction with submittal review and construction observation on a full-time basis.

Union Pacific Railroad, Tunnel No. 2, Keddie, California. Roberto served as resident engineer for the mining of a collapsed tunnel in foliated schist providing additional support with spilling, grouting and shotcrete as required for the Union Pacific Railroad. A top heading excavation method was utilized in a portion of the tunnel that collapsed up to the ground surface. Liner consisted of steel sets and channel lagging backfilled with concrete.

Union Pacific Tunnel Clearance Improvements, Feather River and Fremont, California. Roberto served as resident engineer for notching railroad tunnels to improve clearance. Notching was performed with a roadheader mounted on a rail car. Resin encapsulated rock bolts were installed through the existing concrete liners to provide additional liner support or to replace existing rock bolts located in the notched area. Responsible for measuring air flows and toxic gases during the operation. Notching was performed in 10 tunnels located in the Feather River Canyon and one tunnel in Fremont.

Southern Pacific, Tehachapi Tunnel Clearance Improvement Project, Caliente and Tehachapi, California. Roberto served as resident engineer for this project. Twelve tunnels between Caliente and Tehachapi were enlarged to accommodate double-stack container trains. The work consisted of installing crown rock bolts and sidewall tiebacks, pumping cement grout behind the concrete liner to fill voids, and notching with a roadheader.

Conrail, Tunnel Enlargement, Gallitzin, Pennsylvania. The brick liner of the 3,600-foot-long tunnel was removed and the tunnel enlarged from a single-track to a double-track configuration. Coal mines were present over the tunnel and caused several collapses. Support consisted of rock dowels and pre-stressed rock bolts with steel-fiber-reinforced wet mix shotcrete. Provided construction management services and supervised six engineers and technicians on three shifts per day. Roberto served as Resident Engineer.

ICF-Kaiser, Berry Street Tunnel Rehabilitation and Enlargement Project, Pittsburgh, Pennsylvania. The project involved enlargement of a 100-year-old brick railroad tunnel and conversion to a bus tunnel, excavation of shale and sandstone, lattice girder, shotcrete and rock dowel support, and new drainage systems. Roberto collaborated in the design approach, plans and specifications, engineer's cost estimate, and Geotechnical Design Summary Report. He also reviewed contractor's value engineering proposal.

La Nacional, Loma Larga Tunnels, Monterrey, Mexico. Project Manager for alternate design and blasting recommendations for the construction of the tunnels. The 2,350 feet long twin highway tunnels have a semi-circular shape with a horizontal diameter of 58 feet making it a large underground cavern. Reviewed available borings and site geology and provided design for various support categories based on the RMR and Q methods. Proposed liner was of fiber-reinforced shotcrete and rock bolts in lieu of the original design of wire mesh and plain shotcrete. Further analysis of the benefits of utilizing rock bolt was conducted by numerical methods (FLAC). Provided tunnel blasting recommendations for optimizing drillhole diameter, spacing and blast sequence of the benched heading. The perimeter of the tunnel was blasted by innovative smooth blasting methods.

Wheeling & Lake Erie, Robertsville Tunnel Rehabilitation, Robertsville, Ohio. The 550-foot-long railroad tunnel supported by timber sets has erodible shales, which weaken the sidewalls and requires continuous ditch maintenance. Roberto served as Project Manager and provided field investigation and alternative recommendations with cost estimates followed by plans and specifications for shotcreting the sidewalls and providing shotcrete and rock bolt support to one portal and a new portal excavation.

Oregon Department of Transportation (DOT), Elk Creek Highway Tunnel, Elkton, Oregon. Roberto was Project Manager for the rehabilitation of the 1,150 feet long Elk Creek highway tunnel. Performed tunnel exploration by probes through wood liner and ground penetration radar methods. Accomplished geological mapping and rock mass classification of the tunnel including Schmidt rebound hammer and point load testing of the rock. Developed design of tunnel ground support for the new clearance envelope, consisting of fiber-reinforced shotcrete, rock bolts, lattice girders, and steel sets. Prepared plans and specifications for Oregon DOT for the ground support and portal structures. Included engineer's cost estimate, which was within 10 percent of successful bidder's proposal.

BNSF, Tunnel Enlargement, Martinez, California. As Project Manager, Roberto provided preliminary design and cost estimate for the enlargement of three tunnels in Martinez. The concrete-lined tunnels were enlarged in 1989 for double stack clearance by performing notches that exceeded 2 feet and undercutting. The proposed notching is to achieve Chrysler car clearance. The work will involve notching with a road header and installing new resin-grouted rock bolts above and below the new notch.

Union Pacific, Clearance Improvement Program of the Donner Pass Tunnels, Sacramento, California to Reno, Nevada. As Project Manager, Roberto prepared plans and specifications for enlarging 25 tunnels for double stack and Chrysler car clearance. Several of the tunnels will require remining or undercutting. Prior to notching with a road header the tunnels will be grouted and reinforced with rock bolts. Construction costs were estimated in the order of $12 million.

BNSF, Ostrander Tunnel Rehabilitation, Kelso, Washington. The timber set and lagging supported tunnel was burned to ashes after a forest fire. The 430-foot-long tunnel built in vesicular basalt was literally cooked by the fire and had to be scaled by mechanical methods. Final support was achieved with the installation of resin-grouted rock bolts and steel fiber-reinforced shotcrete. Bidding documents were prepared in an accelerated schedule and the work was completed in 28 working days. Roberto was Project Manager.

Puget Sound Energy, Lower Baker Tunnel In-Depth Inspection, Concrete, Washington. The Lower Baker Tunnel has had a long history of water flows on the downstream abutment partially originating from the concrete lined tunnel. When the 22-foot-diameter tunnel is dewatered inflows are in the order of 800 gallons per minute originating in cracks and previously installed grout pipes. The tunnel was mapped indicating existing cracks, construction joints, and areas of seepage and leaks. Nondestructive testing consisting of ground penetration radar and sonic/ultrasonic methods were utilized to determine the extent of poor concrete and the location of voids in the concrete and between the concrete and rock. Probe holes drilled through the concrete liner verified and calibrated the ground penetration radar and sonic measurements. Roberto served as Project Manager for this project.

Puget Sound Energy, Lower Baker Tunnel Rehabilitation, Concrete, Washington. Roberto served as Project Manager for this project. Based on the results of the Lower Baker Tunnel In-Depth Inspection, a rehabilitation program was implemented consisting of cement and chemical grouting of voids behind the concrete liner and within the concrete liner. A valve attached to a steel plate anchored to the concrete was used to seal one grout pipe that was leaking approximately 300 gallons per minute. Once the flow was stopped, polyurethane grout was injected into the grout pipe successfully stopping the flow. Significant cracks were grouted through holes drilled into the liner. Other work consisted of surface repairs of cavitation areas and sealing cracks on the surface.

PUBLICATIONS

Lake Ft. Smith Microtunneling Lake Tap, Guardia, R., Winkler, K., Rasmussen, P., and Lewtas, T. Proceedings Rapid Excavation and Tunneling Conference, Seattle, June 2005.

Rehabilitation of the Cape Creek Highway Tunnel Under Traffic, Robinson, R. A., Shell, T., Guardia, R., Rodolf, S., Proceedings Rapid Excavation and Tunneling Conference, Seattle, June 2005.

Predicted versus Actual Obstructions for Two Pipe-jacked Tunnels of The Henderson CSO, Seattle, Washington, Cowles, B., Guardia, R., Robinson, R., Andrews, R., Molvik, D., Proceedings Rapid Excavation and Tunneling Conference, Seattle, June 2005.

"Conceptual Design for a Deep Underground Science and Engineering Laboratory," by H.C. Haxton, J.F. Wilkerson, R. Robinson, and R. J. Guardia, Proceedings of the Rapid Excavation and Tunneling Conference, June 2005.

Godlewski, P.M., and Guardia, R.J., 2003, Transportation Tunnel Rehabilitation *in* Rapid Excavation and Tunneling Conference, New Orleans, La., June 2003, Proceedings, New Orleans, La..

Neil, D.M., and Guardia, R.J., 2002, Tomographic Ground Imaging for the Henderson CSO Treated Tunnel Alignment, King County, Washington, Proceedings North American Tunneling, Seattle, May.

Guardia, R.J., Robinson, R.A., Godlewski, P.M., and Hultman, W.A., 2002, Reconditioning of Transportation Tunnels in the Pacific Northwest, Proceedings North American Tunneling, Seattle, May.

Parker, H.W., Godlewski, P.M., and Guardia, R.J., 2002, The Art of Tunnel Rehabilitation with Shotcrete, Shotcrete Magazine, American Shotcrete Association, Fall.

Fisk, P.S., Guardia, R.J., and Porter, W.D., 2002, Lower Baker Tunnel Investigation and Repairs, Proceedings North American Tunneling, Seattle, May.

Robertson, C.A., Guardia, R.J., Robinson, R.A., and Rustvold, J.W., 2001, Bonneville Power Administration Cold Creek Pipeline Replacement, Proceedings Rapid Excavation and Tunneling Conference, San Diego, June.

Parker, H.W., Robinson, R.A., Godlewski, P.M., Hultman, W.A., and Guardia, R.J., 2001, Tunnel Rehabilitation in North America, Proceedings International Tunneling Association World Tunnel Congress, Milan, June.

Guardia, R.J., Robertson, R.A., and Laird, J.R., 2000, Tunnel Inspection Manual, prepared for Oregon Department of Transportation, June, 96 p.

PROFESSIONAL ASSOCIATIONS

American Society of Civil Engineers
American Shotcrete Association; Individual Member
American Railway Engineering and Maintenance of Way Association; Associate Member

MICHAEL P. HEDDEN

Mr. Hedden is Managing Director in the Real Estate Solutions Group of FTI Consulting, specializing in providing valuation and appraisal of industrial, commercial, residential, real, and special purpose property. His business address is 750 Third Avenue, 27th Floor, New York, New York 10017. Mr. Hedden is sponsoring portions of Section III-F of CSXT's Reply Evidence related to Road Property Investment and Real Estate. Mr. Hedden has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Hedden has over 30 years of experience in all aspects of real estate market analysis and valuation. He has appraised properties across the United States for purposes of property tax, financial reporting, financing, purchase or sale, insurance, fair rental, tax reporting condemnation and donation. He is certified as a real estate appraiser in 13 states.

Mr. Hedden is a member of the Appraisal Institute, Counselors of Real Estate and Royal Institute of Chartered Surveyors. He previously served as Managing Director of the American Appraisal Associates. He earned his Bachelor of Science of Marking from the University of Bridgeport and a Master of City and Regional Planning at Rutgers University.

Mr. Hedden's complete curriculum vitae is attached.

VERIFICATION

I, Michael P. Hedden, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Michael P. Hedden

Executed on this 14 day of July 2014.

Michael P. Hedden, MAI, CRE, FRICS

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Education
B.S. in Marketing, University of Bridgeport

M.C.R.P., Rutgers University

Industries
Banking/Financial Services, Construction, Healthcare, Hospital, Industrial Manufacturing, Legal Services, Leisure and Hospitality, Real Estate, Restaurant, Retail

Certifications
MAI, Appraisal Institute

Counselor of Real Estate (CRE)

Fellow Royal Institution of Chartered Surveyors (FRICS)

General Certified Real Estate Appraiser: New York, New Jersey, Connecticut, Massachusetts, Pennsylvania, Delaware, Maryland, Virginia, Georgia, Illinois, Florida, California, Washington

Professional Affiliations
Appraisal Institute
Past President
Metro NJ Chapter

Counselors of Real Estate
Past Chair,
NJ Chapter

Urban Land Institute

Michael P. Hedden is a managing director in the FTI Real Estate Solutions practice and is based in New York. Mr. Hedden specializes in providing valuation, litigation support and expert testimony services for clients. He is a knowledgeable real estate expert with over 30 years of experience in all aspects of the market analysis and valuation of real property. Mr. Hedden has experience in the appraisal of industrial, commercial, residential and special purpose property including hospitality, hospital and healthcare facilities. He has developed broad experience in the valuation of properties with detrimental conditions and is a recognized expert in the valuation of property suffering from environmental contamination.

Mr. Hedden has experience in the valuation of investment and user-based specialized real estate and real estate-related enterprises. He has appraised properties in many U.S. states. Purposes have included property tax, financial reporting, financing, purchase or sale, insurance, fair rental, tax reporting, condemnation, and donation. Advisory services performed by Mr. Hedden have included appraisal review, market research, appraisal management, and offer/option analysis

Mr. Hedden has significant expert testimony experience and has appeared before the U.S. District Court, Superior Court of New Jersey, U.S. Bankruptcy Court, New Jersey State Tax Court, New Jersey Legislature Committee, and various condemnation and zoning boards.

Prior to joining FTI Consulting, Mr. Hedden was a managing director with American Appraisal Associates where he provided expert testimony and litigation support for clients as well as prepared valuations used for financial reporting. Prior to that, he was a director for CBIZ Valuation Group, LLC. Before joining CBIZ, Mr. Hedden was president of Realty Economics Group, a real estate consulting and appraisal firm working for various government, public, and private entities throughout the New York metropolitan area.

A member of the Appraisal Institute (MAI) and the Counselors of Real Estate (CRE) and a distinguished Fellow of the Royal Institute of Chartered Surveyors (FRICS), Mr. Hedden earned a Master of City and Regional Planning (M.C.R.P.) degree from The Edward J. Bloustein School of Planning and Public Policy at Rutgers University and a Bachelor of Science degree in marketing from the University of Bridgeport. He has been a licensed real estate broker in New Jersey since 1978. In addition, Mr. Hedden holds general certified real estate appraiser licenses in New York, New Jersey, Connecticut, Massachusetts, Pennsylvania, Delaware, Maryland, Virginia, Georgia, Florida, California and Washington.

Expert Testimony/Depositions

Tropicana v. City of Atlantic City, New Jersey, Docket Nos.: 7568-2008; 4012-2009; 3178-2010 and 8024-2011

Trump Taj Mahal Associates, LLC vs. City of Atlantic City, New Jersey, Docket Nos.: 7574-2008,; 10192-2009; 584-2010

Trump Marina Associates, LLC vs. City of Atlantic City, New Jersey, Docket Nos.: 7488-2008; 10454-2009; 6062-2010

FTI CONSULTING

CRITICAL THINKING
AT THE CRITICAL TIME

Trump Plaza Associates, LLC vs. City of Atlantic City, New Jersey, Docket Nos.: 7488-2008; 10454-2009; 6064-2010

New Jersey Turnpike Authority v. PRI Washington Township, New Jersey et al, Superior Court of New Jersey; Docket No. MER-L-1890-10

Borough of Carteret, etc. v. CDI Industries, Inc., et al., Docket No. MID-L-4534-05, Superior Court of New Jersey, Middlesex County

New Brunswick Housing Authority v. New Brunswick Industries, Superior Court of New Jersey, Middlesex County

Action Manufacturing Company v. Simon Wrecking Company, Civil Action No. 02-8964, U.S. District Court, Eastern District of Pennsylvania

United States of America and The Chemclene Site Defense Group v. Chemclene Corporation, W. Lloyd Balderston, Estate of Ruth Balderston and Springridge Management Corporation, Inc.

Omega Healthcare Investors, Inc. v. Res-Care Health Services, Inc., et al., Case No. 1:99-cv-862, U.S. District Court, Southern District of Indiana

Metuchen I, LLC v. Borough of Metuchen, Docket No. 00878 2000, Tax Court of New Jersey, March 29, 2004

Reliance Trust Company v. Greater Exodus Missionary Baptist Church, Docket No. F-12330-02, Superior Court of New Jersey, Atlantic County, New Jersey

New Jersey Turnpike Authority v. Michael Feldman Associates, et al., Docket No. BURL-L-2519-97, Superior Court of New Jersey, Burlington County, New Jersey

Hans and Helena Tielmann v. Camp Dresser & McKee, Inc., et al., Docket No. L-1559-00, Superior Court of New Jersey, Law Division, Morris County, New Jersey

Custom Distribution Services, Inc. v. City of Perth Amboy, Nos. 95-37206, 95-3218, U.S. Bankruptcy Court D. New Jersey, December 17, 1997

Shakelly v. DeFilippo et. als. Docket Number MID-L-5201-06 Superior Court of New Jersey, Middlesex County

Pansini Custom Design Associates, LLC and Roger Parkin Joint Venture v. City of Ocean City and Patrick Newton, Construction Code Official of the City of Ocean City, Docket No. A-2003-0 17 T1, Superior Court of New Jersey, Atlantic County

New Jersey Department of Transportation v. Bellemead Development Corp., Commissioners Hearing, Somerset County New Jersey

Borough Of Paulsboro vs. Essex Chemical Corporation, Superior Court of New Jersey Law Division - Gloucester County Docket No. Glo-L-699-06

MT Ventures vs. Mount Freedom Golf Partners, Chancery Division, Morris County, New Jersey - Docket No. MRS-C-65-09

The People of the State of New York v. First American Corporation and First American eAppraiseIT (Supreme Court, N.Y. Co., Index No. 07-406796)

Textron Financial-New Jersey, Inc v.Herring Land Group, LLC, Case No. 3:06-cv-02585-MLC_DEA, U.S. District Court, District of New Jersey, Trenton Division, *Bayonne Medical Center v. Bayonne/Omni Development, L.L.C.*, Case No. 07-15195 (MS), United States Bankruptcy Court, District of New Jersey, In re Bayonne Medical Center

Reported Decisions

Metuchen I, LLC v. Borough of Metuchen, Docket No. 00878 2000, Tax Court of New Jersey, March 29, 2004

Custom Distribution Services, Inc. v. City of Perth Amboy, Nos. 95-37206, 95-3218, U.S. Bankruptcy Court D. New Jersey, December 17, 1997

Pansini Custom Design Associates, LLC and Roger Parkin Joint Venture v. City of Ocean City and Patrick Newton, Construction Code Official of the City of Ocean City, Docket No. A-2003-0 17 T1, Superior Court of New Jersey, Appellate Division

Publications

Examining the Role of Risk and the Appraiser in Property Valuatio; New York Law Journal; June 18, 2012

The Appraiser's Approach: Commercial Investment Real Estate; May/June 2012 (co-authored with Marc Shapiro)

Bid vs. Ask - Motivated investors are closing the pricing gap on institutional assets. Commercial Investment Real Estate; May/June 2011

2003 Lender Survey: Preferences in Financing Senior Housing and Long Term Care Projects, Maryland: National Investment Center for Senior Housing & Care Industries and CBIZ Valuation Group, Inc., 2003 (coauthored with David A. Arnoldi)

Residential Redevelopment of Brownfields: What Are the Valuation Issues?, New Jersey: National Center for Neighborhood and Brownfields Redevelopment, Edward J. Bloustein School of Planning and Public Policy, Rutgers University, 1999 (coauthored with Jan Wells PhD)

Presentations

"Real Estate Accountancy/Compliance Breakfast", RICS Americas Tri-State Chapter, June 5, 2012

"Easement Valuations: Common Pitfalls and Principles" Lorman Education Services, Webinar, June 26, 2012

"The Use of Rent Coverage Ratios in the Valuation of Healthcare Properties," The 24th Pan Pacific Congress of Real Estate Appraisers, Valuers and Counselors, Seoul, Korea, September 2008

"Fair Value and Highest and Best Use - The Real Estate Perspective," AICPA National Real Estate Conference, Las Vegas, Nevada, November 2007

"Mock Trial" and "Takings of Unique or Special Properties," Eminent Domain Conference, CLE International, Princeton, New Jersey, October 2007

"Condemnation Valuation - Its Impact on Your Property and Your Projects," Eminent Domain Conference, CLE International, Princeton, New Jersey, October 2006

"Valuation of Contaminated Property," New Jersey County Tax Board Administrators, March 2002

"Appraisal Process Considering Environmental Impairments," Realtors' Tri-State Convention and Trade Show, Atlantic City, New Jersey, December 2000 (panelist)

"Residual Redevelopment of Brownfields: What are the Valuation Issues?," The Bloustein School of Planning and Public Policy at Rutgers University, November 1999 (leader of symposium)

"How to Buy and Sell Contaminated Property - Appraising Contaminated Properties," Institute of Continuing Legal Education in New Jersey (presenter)

"Litigation Issues Relating to MTBE Drinking Water Contamination," Institute of Continuing Legal Education in New Jersey (presenter)

"Transactional and Litigation Pitfalls in the Sale of Residential and Commercial Real Estate," New Jersey Institute for Continuing Legal Education, New Brunswick, New Jersey, January 14, 2010.

"Real Estate and Land Valuation in Depressed Markets," Lorman Education Services, Webinar, October 5, 2010.

"Commercial Property Assessing in Distressed Markets," Society of Professional Assessors - Annual New Jersey Seminar, East Rutherford, New Jersey, April 9, 2010.

"Easement Valuations: Common Pitfalls and Principles," Lorman Education Services, Webinar, December 3, 2009.

"International Financial Reporting Standards (IFRS) - Introduction to Valuation for Financial Reporting and Case Studies," IAAO/RICS 2010 Commercial Real Estate Symposium, Baltimore, Washington, March 18, 2010.

"How to Understand Expert Valuations," New Jersey Institute for Continuing Legal Education, 12th Annual Honorable William H. Gindin Bankruptcy Bench-Bar Conference, New Brunswick, New Jersey, April 16, 2010.

"Case Studies in Valuation for Financial Reporting," Appraisal Institute-Appraisal Institute of Canada, Summer Conference, Toronto, Canada, June 27, 2004

Instruction

"Highest & Best Use and Market Analysis," Appraisal Institute Course

"Real Estate Finance, Statistics, and Valuation Modeling," Appraisal Institute Course

"Valuation for Financial Reporting," Appraisal Institute Course

"How to Buy and Sell Contaminated Property," New Jersey Institute for Continuing Legal Education Seminar

"Litigating Regulatory Takings Cases," New Jersey Institute for Continuing Legal Education Seminar

Various seminars for the Municipal Tax Assessors Association in New Jersey, New Jersey Association of Realtors, and the National Association of Industrial and Office Parks.

Valuation and Special Courses

"Analyzing Distressed Real Estate," Appraisal Institute

"Environmental & Property Damages: Standards, Due Diligence, Valuation & Strategy," Appraisal Institute

"Environmental Risk and the Real Estate Process," Appraisal Institute

"Measuring the Effects of Property Contamination from Hazardous Materials on Real Estate Prices: Techniques and Applications," Appraisal Institute

"Valuation of Detrimental Conditions in Real Estate," Appraisal Institute

State Certifications

State of California, Certified General Real Estate Appraiser, #AGO36595

State of Connecticut, Certified General Real Estate Appraiser, #RCG0001042

State of Delaware, Certified General Real Property Appraiser, #X1-0000397

State of Florida, Certified General Appraiser, #RZ3081

State of Georgia, Certified General Real Property Appraiser, #280761

State of Illinois, Certified General Real Property Appraiser, #553.002184

State of Maryland, State Certified General Appraiser, #11924

Commonwealth of Massachusetts, State Certified General Appraiser, #100962

State of New Jersey, Certified General Appraiser, #RG00206

State of New Jersey, Real Estate Broker, #RB7814861

State of New York, Real Estate General Appraiser, #46000041828

Commonwealth of Pennsylvania, Certified General Appraiser, #GA001660R

Commonwealth of Virginia, Certified General Real Estate Appraiser, #4001009126

State of Washington, Certified General Real Estate Appraiser, #1101650

Professional Affiliations

Appraisal Institute, MAI Designated Member #7357

Counselors of Real Estate, CRE Member # 2158

Royal Institute of Chartered Surveyors, FRICS Member # 1227210

Employment History

American Appraisal Associates, New York, *Managing Director* 2007 – 2010

Mr. Hedden served as a Managing Director and the Northeast Practice Leader for the U.S. Real Estate and related assets practice of American Appraisal.

CBIZ Valuation Group, New Jersey, *Director of Real Estate* 2003 - 2007

Mr. Hedden served as the Director of Real Estate for CBIZ Valuation group. In this capacity he ran the real estate valuation, consulting and litigation practice on a national level.

Michael P. Hedden, MAI Inc., d/b/a Realty Economics Group, *President*	1990 – 2002
Mr. Hedden served as the President and leader of this Real Estate Consulting and Appraisal firm for various government, public and private entities throughout New Jersey.	
Martin, Benner, Pintinalli, Hedden, Inc., *Vice President*	1988 – 1990
Mr. Hedden served as a Real Estate Consultant for various government, public and private entities.	
Hedden – Izenberg Appraisal Associates, *President*	1987 – 1988
Mr. Hedden ran this Real Estate appraisal and consulting firm which provided a full spectrum of narrative appraisals and documents.	
Landauer Associates, Inc., *Vice President*	1985 – 1987
Mr. Hedden was part of the valuation and technical services division which was responsible for national real estate counseling.	
Glander Bates Associates, *Appraiser/Consultant*	1983 – 1985
Barkan Associates, *Staff Appraiser*	1982 – 1983
Patrick L. Hedden Realty Company, Vice President	1976 – 1981
Mr. Hedden was actively involved with this full service brokerage company servicing central New Jersey.	

DAVID HUGHES

Mr. Hughes has over 30 years of experience as a professional engineer in railroad engineering and railroad operations and maintenance supervision. Mr. Hughes' business address is 157 Grey Fox Trail, Clayton, Georgia 30525. Mr. Hughes is sponsoring Section III-D-4 relating to Maintenance-of-Way costs of CSXT's Reply Evidence. Mr. Hughes has signed a verification of the truth of the statements contained therein. A copy of the verification is attached hereto.

From 1967 to 1975, Mr. Hughes had numerous responsibilities at Southern Pacific Railroad, including first line supervision of track maintenance and bridge and building maintenance. Mr. Hughes served as Vice President of Engineering for the Boston and Maine Railroad from 1975 to 1980, where he had responsibility for track structures, signal systems maintenance, and reconfiguring and reconstructing 155 route miles of mainline. Mr. Hughes next served as President of Pandrol, Inc. and Speno Rail Services, where he assisted railroads in developing high-performance track components and mechanized rail and ballast maintenance practices. In 1985, Mr. Hughes became President of the Bangor & Aroostook Railroad, a regional railroad in the northeastern United States. He later served as Chief Engineer for the National Railway Passenger Corp ("Amtrak") and as its Acting President and Chief Executive Officer.

Mr. Hughes has previously served as Chairman of the Regional Railroads of America. He was a director of the American Railway Engineering Association ("AREA"). He has served on the Association of American Railroads Board of Directors.

Mr. Hughes' complete curriculum vitae is attached.

VERIFICATION

I, David Hughes, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

David Hughes

Executed on this 10th day of July 2014.

DAVID HUGHES

David Hughes is an independent railroad consultant with broad consulting and executive experience in railroad infrastructure and railroad operations. He specializes in identifying strategies through which railroads can manage their infrastructure, operations, and investments to realize strategic objectives, optimize asset reliability and maximize the long term cash flow. Recent or on-going consulting assignments include:

- Currently providing technical and economic advice to Norfolk Southern Corporation regarding the design, construction and maintenance of a 7000 mile stand-alone railroad in the US as part of a proceeding before the US Surface Transportation Board

- Recently advised a major owner and operator of regional railroads in the US on track, bridge and signaling issues related to their planned acquisition of RailAmerica, the largest operator of regional railroads in the world.

- Worked with the Peruvian Ministry of Transportation to develop a methodology for evaluating the economic feasibility of building new rail lines in the Peruvian Andes, including investment requirements and operating costs and applying the methodology to evaluate several proposed projects.

- Advised a major iron ore hauling railroad in Canada on infrastructure capacity expansion requirements necessary to increase annual iron ore throughput by 250%.

- Recently advised a major African heavy haul railroad regarding infrastructure investment requirements as part of a long term integrated corridor commercial strategy. The project included estimating infrastructure capacity expansion costs, operating costs and financial feasibility of the required investments.

- Recently advised the Dedicated Freight Corridor Corporation of India on design and contracting standards for construction of a new national heavy haul rail network, as a member of a panel of international experts.

- Assisted a major private equity firm in performing infrastructure due diligence on $2 billion acquisition of a US railroad company. Later, provided estimates of capital investment requirements to support refinancing of the acquisition.

- In a dispute involving economic damages due to rail service irregularities on a U.S. heavy haul railroad, Mr. Hughes provided an expert verified testimony regarding the adequacy of coal line maintenance practices and expenditures and an assessment of the reasons for infrastructure failure.

- For a standalone rate case in the western U.S., provided an expert verified statement determining the maintenance and operating costs a new heavy haul rail line for a standalone railroad in a standalone rate case before the Surface Transportation Board

- In a proceeding before the Surface Transportation Board, provided an expert verified statement regarding the adequacy of a light density railroad to transport heavy haul coal unit trains and the scope of work and cost to upgrade the infrastructure of the line

- Evaluated the capital investment and ongoing infrastructure maintenance necessary to introduce 18,000 ton coal trains on a light density branch line for a major US railroad.

- Prepared an infrastructure maintenance and investment plan for 2,000 miles of high density coal railroad in conjunction with litigation about coal transportation rate reasonableness for two major western railroads.

- Assessed the long term infrastructure investment requirements as part of a due diligence for a major railroad financial transaction.

In addition to the recent assignments above, Mr. Hughes has been engaged in dozens of assignments in over 27 countries, including Chile, Peru, Bolivia, Uruguay, Argentina, Brazil Kazakhstan, Poland, Czechoslovakia, Hungary, Africa, Asia and North America.

Mr. Hughes also has extensive executive experience in the railroad industry. Most recently he served as Acting President and CEO of Amtrak 2005-2006. He served four years as chief engineering officer of Amtrak before becoming Acting CEO. He also served as President of the Bangor and Aroostook Railroad, President of Pandrol Incorporated, a manufacturer of track fastening products for the railroad industry and President of Speno Rail Services, a railroad track maintenance contractor. Earlier in his career he was vice president engineering and Acting President of the Boston & Maine railroad and held numerous engineering and management positions with Southern Pacific railroad, including bridge and building supervisor and general track foreman.

His industry and community activities have included:

- Director, The Association of American Railroads
- Director, American Railway Engineering and Maintenance Association
- Member, AAR Track Research Committee
- Member, various engineering and operating committees of AAR
- President and cofounder, Regional Railroads of America
- President, New England Transportation Research Form
- Director, Transporting the Elderly and Handicapped in New England
- President, Maine Chamber of Commerce

Mr. Hughes has testified before the United States Congress on numerous occasions regarding railroad passenger and freight financing and infrastructure issues. He has testified in Federal District court and before the Interstate Commerce Commission (now STB) on legal and commercial matters.

Mr. Hughes holds a B.S degree in civil engineering from the University of Texas and a Masters Degree in business administration from the Harvard Business School and has over 30 years of experience as a registered professional civil engineer. He is fluent in English and has a working knowledge of Spanish and Brazilian Portuguese.

Contact information:

David Hughes
4622 Fisher Island Drive
Miami Beach, FL 33109, USA
+1 (954) 616-9742 (cell)
david.hughes@foxglove.us.com

Mr. Hughes' professional experience uniquely qualifies him to accurately assess the MOW work load and resource requirements of the DRR.

He has hands on field experience as a General Track Foreman in Utah and a Bridge and Building Supervisor in Texas. As general track foreman, he actually inspected track for defects and either personally made repairs or scheduled the repairs by a maintenance gang. He also supervised the work of section gangs, smoothing gangs and welders.

As bridge and building supervisor on the UP (former SP) in Houston, he was personally responsible for performing annual bridge inspections and prioritizing bridge maintenance. He also was responsible for maintenance of equipment maintenance facilities and other railroad facilities in the Houston Terminal.

In addition to his first line experience, Mr. Hughes has served as chief engineer of the Boston and Maine (B&M) Railroad and, more recently, chief engineer of Amtrak. As the B& M was in bankruptcy reorganization when Mr. Hughes was chief engineer, he gained valuable experience in effectively maintaining track and structures at the lowest possible cost.

Mr. Hughes has also benefited from his experience in the railroad track supply and track maintenance industry. As president of Pandrol, Inc. (a manufacturer of track fastening systems) and as president of Speno Rail Services (a railroad track maintenance contractor) he spent extensive time in the field on every class I railroad in north America, observing first hand maintenance problems and devising solutions that could be applied.

Mr. Hughes' experience goes far beyond the class I railroads of North America. He has extensive experience with regional and short line railroads and railroads internationally.

As co-founder and first chairman of Regional Railroads of America, he has testified before Congress on several occasions about the capital and maintenance requirements of small railroads. He had personal relationships with the leaders of the small railroad industry and had frequent discussions with them about their techniques for profitably operating railroads that class Is had sold to them.

Mr. Hughes had another window into the MOW practices of small railroads. In a consulting capacity, he has performed due diligence reviews of dozens of MOW plans on behalf of lenders or buyers of lines being spun off by class Is or of existing lines being bought or sold by private parties. These due diligence studies generally involved hi-rail inspection trips over the lines and interviews of MOW officials regarding their organizations and plans for maintaining the lines. The reports that resulted included an assessment of the adequacy of the MOW plan and suggestions of ways it could be strengthened.

In addition to his work with class I and small railroads in North America, he has many years of experience working with MOW organizations in over 25 railroads in Mexico, South America, South Africa, Europe and countries from the former Soviet Union.

Furthermore, Mr. Hughes has a long history of participation in professional engineering organizations and keeps those contacts current. He has been a director of the Engineering Division of the AAR, a director and member of the Board of Governors of the American Railway Engineering and Maintenance Association, president of the Transportation Research Forum of New England. He has served on the AAR committee prioritizing new research investments and has attended several annual meetings of the International Heavy Haul Association. He has been a frequent visitor to the Facility for Accelerated Service Testing (FAST) in Pueblo, Colorado where he followed the performance of various track components under heavy haul conditions. He has over 30 years' experience in the railroad industry as a professional engineer.

DANIEL KLAUSNER

Mr. Klausner is a Managing Director at FTI Consulting and a member of FTI Capital Advisors, with offices located at 3 Times Square, 9th Floor, New York, New York 10036. Mr. Klausner has more than 20 years of experience in investment banking and capital markets. Mr. Klausner is sponsoring portions Section III-G of CSXT's Reply Evidence relating to equity flotation costs. Mr. Klausner has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Klausner's experience includes advising companies, private equity firms, and venture capital funds on capital raising, equity offering reading, and investment banking project management. He has advised clients on numerous initial public offerings ("IPOs") and other transformational events such as divestitures or carve-outs. Prior to joining FTI Consulting and FTI Capital Advisors, Mr. Klausner was the head of Equity Corporate Finance at UBS Investment Bank. He also served as a senior banker in the Investment Banking Department of Morgan Stanley.

Mr. Klausner holds a Bachelor of Science from the University of Pennsylvania and a Master of Business Administration from the Tuck School of Business at Dartmouth College.

Mr. Klausner's biography, with additional relevant experience, is attached hereto.

VERIFICATION

I, Daniel Klausner, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Daniel Klausner

Executed on this 14 day of July 2014.

Daniel Klausner

Managing Director

3 Times Square | 9th Floor| New York, NY 10036
+1 212 651 7119
daniel.klausner@fticonsulting.com

Certifications

FINRA Series 7, 24 and 63

Education

B.S., The Wharton School, University of Pennsylvania

M.B.A., The Tuck School of Business, Dartmouth College

Publications

Authored chapter on "Role of the Investment Bank" in "Going Public: A Guide for Companies Listing on the US Securities Markets" NASDAQ, 2010

About

Professional and Industry Experience:

Daniel Klausner is a Managing Director at FTI Consulting and is based in New York. Mr. Klausner is also a member of FTI Capital Advisors, an investment banking subsidiary of FTI Consulting and has more than 20 years of investment banking and capital markets experience advising companies, private equity and venture capital firms on capital raising, equity offering readiness and investment banking project management.

Mr. Klausner specializes in advising clients that are facing transformational events, such as an initial public offering (IPO), divestiture or carve-out. He is responsible for managing the path to the event across all critical work streams, including pre-IPO readiness and capital markets advisory.

Specifically, Mr. Klausner has focused on structuring, capital markets advisory, capitalization, projections, pre-IPO readiness, due diligence, corporate governance, timing, positioning, valuation and pricing strategy. In particular, he is skilled at advising companies nine to twelve months before they decide to go public with a track record to a successfully marketed IPO.

Mr. Klausner has broad expertise across a wide range of U.S. and global industries, including oil and gas; real estate; chemicals; consumer and retail; financial institutions; industrials; technology and media.

Prior to joining FTI Consulting, Mr. Klausner was the head of Equity Corporate Finance, Americas within the Equity Capital Markets group at UBS Investment Bank. At UBS, he advised clients on more than $100 billion of financings across a wide array of strategic financing activities, including IPOs, follow-on offerings, carve-outs, spin-offs and private placements. Mr. Klausner led franchise transactions for Banco Santander Mexico's IPO; General Growth Properties' restructuring and IPO; MPLX IPO; Spirit Realty Capital IPO; Qihoo 360 Technology IPO; Margaret Cargill Trust, which included advisory services and Mosaic's equity sell down; Cadbury Schweppes and Dr. Pepper Snapple's demerger and spin off; and Visa's IPO.

Before that, Mr. Klausner was a senior banker in the Investment Banking department at Morgan Stanley, where he was responsible for oversight of the entire execution process of lead-managed equity and debt products.

Mr. Klausner has participated in numerous speaking events, including "The SEC in 2013" Kelley Drye, 2013; "Taking Your Company Public" UBS Investment Bank, 2012 Spring and Fall IPO Conferences; "2012 IPO Readiness" DLA Piper and BDO, 2012; and "U.S. JOBS Act: Israeli Emerging Growth Companies" Gibson Dunn, 2012.

FTI CONSULTING

DAVID A. MAGISTRO

Mr. Magistro is a Senior Engineer/Project Manager with STV, a professional firm offering engineering, architectural, planning, environmental, and construction management services with offices located at 6701 W. 64th Street, Suite 320, Mission, Kansas 66202. Mr. Magistro has more than 14 years of experience with structural design, almost all of which have been focused on movable bridges and railroad structures. Mr. Magistro is sponsoring portions of Section III-F of CSXT's Reply Evidence relating to Bridges. Mr. Magistro has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Magistro's experience includes structural steel design, steel bridge rehabilitation, fixed bridge and moveable bridge inspection, fixed bridge and movable bridge design including structural and mechanical aspects, plan production, and project management for numerous railroad and transportation agency clients. Mr. Magistro holds a Bachelor of Science, Civil Engineering from Kansas State University and is a member of the American Railway Engineering and Maintenance-of-Way Association (AREMA).

Mr. Magistro's complete curium vitae, with additional project experience, is attached.

VERIFICATION

I, David A. Magistro, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

David A. Magistro

Executed on this 16th day of July 2014.

David A. Magistro, P.E.

Senior Engineer/Project Manager

Mr. Magistro has more than 14 years of experience with structural design, almost all of which has been focused on railroad structures. His is well versed in structural steel design, steel bridge rehabilitation, fixed bridge and movable bridge inspection and design, including structural and mechanical aspects, plan production, and project management for numerous railroad and transportation agency clients.

Employee No.
04910

Department No.
53

Office Location
Overland Park, KS

Date joined firm
3/30/09

Years with other firms
11

Education
Bachelor of Science, Civil Engineering; Kansas State University (1998)

Professional Registrations
Professional Engineer: Missouri (2003/#2003001064/exp. 12/31/13), Kansas (2009/# 20754/exp. 4/30/13), Oklahoma (2009/#24155/exp. 8/31/14)

Memberships
American Railway Engineering and Maintenance-of-Way Association (AREMA) (2005 - Present)

AREMA Committee 15, Subcommittee 6 Chairman (2012-Present)

Heavy Movable Structures (HMS) Registrar (2001 - 2010), Treasurer (2010-Present)

Project Experience

BNSF Bridge 6.3 Rail Joint Replacement – Project Manager
Design project to replace the rail joints and steel ties on this double-track bascule span. The project includes structure modification for the new steel ties and rail joints, and providing a construction sequence to complete the work. (6/12 – Present)

BNSF Bridge 6.3 Operating Strut Reinforcement – Project Manager
Providing fabrication and installation recommendations for the replacement of the bearings the support the main pinions inside the operating struts on this double-track bascule span. The project includes review of fabrication shop drawings and construction sequence to complete the work. (8/12 – Present)

NS Vs. DuPont Rate Case – Project Engineer
Project Engineer responsible for the bridge evidence in this chemical rate case, officiated by the Surface Transportation Board (STB). Responsible for evaluating Opening Evidence generated by DuPont, and compiling Reply Evidence on behalf of NS to establish the construction cost of a Stand Alone Railroad system, upon which NS's shipping rates are based. (5/12 – Present)

BNSF Bridge 231.4 Inspection – Project Manager
Inspection of structural repairs that were made in 2008 to verify that the as-repaired condition merits the as-repaired structural rating. (10/11 – 1/12)

IPA Vs. BNSF/UPRR Rate Case – Project Engineer
Project Engineer responsible for the bridge evidence in this coal rate case, officiated by the Surface Transportation Board (STB). Responsible for evaluating Opening Evidence generated by IPA, and compiling Reply Evidence on behalf of BNSF and UPRR to establish the construction cost of a Stand Alone Railroad system, upon which BNSF's and UPRR's shipping rates are based. (9/11 – 11/11)

BNSF/UPRR Precast Specification Update – Project Manager
Evaluation of the shared standard specification for the manufacture of precast and prestressed concrete components for BNSF and UPRR. The project included bringing the standard specification into accordance with current fabrication practice. (3/11 – 1/12)

BNSF Kansas City Movable Bridge Inspection – Project Manager
Provided walk-through maintenance inspection of the two movable bridges owned by BNSF in the Kansas City area, ASB and Hannibal. The walk-through maintenance inspections included observing all mechanical and electrical equipment in-use, noting deficiencies and areas that will require maintenance or repair. The project ended with a report containing recommendations for all maintenance and repair work. (4/11 - 7/11)

KCPL LaCygne Station Siding Addition – Project Manager
Provided survey of existing track and topography upon which to base the design of the new siding addition. Provided track design for the new siding. Provided roadway design for a roadway overpass alignment that utilized a steel plate arch structure to remove the at-grade crossing. Provided shop drawing review of the fabrication drawings for the steel plate arch structure. (9/10 – 11/11)

AEPCO Vs. UPRR Rate Case – Project Engineer
Project Engineer responsible for the bridge evidence in this coal rate case, officiated by the Surface Transportation Board (STB). Responsible for evaluating Opening Evidence generated by AEPCO, and compiling Reply Evidence on behalf of UPRR to establish the construction cost of a Stand Alone Railroad system, upon which UPRR's shipping rates are based. (2/10 – 5/10)

AEPCO Vs. BNSF Rate Case – Project Engineer
Project Engineer responsible for the bridge evidence in this coal rate case, officiated by the Surface Transportation Board (STB). Responsible for evaluating Opening Evidence generated by AEPCO, and compiling Reply Evidence on behalf of BNSF to establish the construction cost of a Stand Alone Railroad system, upon which BNSF's shipping rates are based. (2/10 – 5/10)

Seminole Electric Vs. CSX Transportation Rate Case – Project Engineer
Project Engineer responsible for the bridge evidence in this coal rate case, officiated by the Surface Transportation Board (STB). Responsible for evaluating Opening Evidence generated by Seminole Electric, and compiling Reply Evidence on behalf of CSX Transportation to establish the construction cost of a Stand Alone Railroad system, upon which CSXT's shipping rates are based. (7/09 – 5/10)

ODOT Robinson Street Grade Crossing - Project Manager
Managing the construction of a detour for rail and vehicular traffic that will be used during construction of a permanent Burlington Northern Santa Fe (BNSF) Railroad grade separation at Robinson Street in Norman, OK. This railroad corridor receives heavy freight traffic and is also an Amtrak corridor. STV's shoofly design will permit rail and roadway traffic to continue during construction. In addition, the firm is assisting the contractor with the design of shoring for the permanent bridge structure. (3/10 - Present)

STV 100

UPRR Oklahoma City I-40 - Project Engineer
Reviewed project plans for the realignment of train tracks along this highway corridor in Oklahoma City. Mr. Magistro reviewed the overhead structures and foundation configuration at each grade separation to determine if the arrangements, clearances, and structural designs met American Railway Engineering and Maintenance-of-Way Association (AREMA) and Union Pacific Railroad (UPRR) requirements. He provided reviews through the duration of the project and interacted with UPRR, the Oklahoma Department of Transportation, utility owners, and construction contractors. (6/09 - 9/10)

New England Central Railroad Bridge 15.21 Modification - Project Engineer
Provided mechanical and structural design services for the conversion of a swing-span bridge from manual to mechanical operation in Swanton, VT. The bridge, which had been operated manually using a capstan, is protected as a state historic resource. The project team successfully incorporated the electric-powered system without altering the appearance or function of the bridge. (5/09 - 10/10)

VDOT Coleman Bridge Cable Replacement - Project Engineer
Designed emergency repairs to the structural and mechanical systems on this 3,750-foot, double swing-span bridge that crosses the York River between Yorktown and Gloucester Point, VA. A tug boat struck the bridge and damaged several cables. Mr. Magistro's work enabled VDOT to restore service to this important toll crossing, which carries the 4-lane U.S. 117 and connects the Peninsula and Middle Peninsula areas of Virginia's Tidewater region. (10/09 - 6/10)

South Central Florida Express Moore Haven Bridge Rehabilitation - Project Engineer
Prepared design plans for new mechanical equipment on this swing-span railroad bridge in Moore Haven, FL, which remained in operation during construction. Engineers completed the transition between the old and new system in a week without causing interruptions to train service. (5/10 - 9/10)

BNSF Bridge 231.4 Structural Inspection, Load Rating, and Structural Repairs - Project Manager/Field Inspector/Design Engineer
Responsible for the comprehensive structural inspection and load rating of the floor system for the roadway portions of this double-deck structure over the Mississippi River in Fort Madison, IA, for the Burlington Northern Santa Fe (BNSF) Railroad. The inspection and load rating was followed by a phase of structural repairs. Mr. Magistro was responsible for the design and construction sequencing of the structural steel repairs for an approach span through plate girders and floor system components, including stringers and floorbeams. (6/08 - 3/09)

Norfolk Southern Bridge 6.66 Rehabilitation - Design Engineer
Managed the structural design for the replacement of curved segments on the rolling girders of this double-track rolling bascule span over the South Branch Elizabeth River in Gilmerton, VA. The project included structural

design and detailing, plan production, construction specifications, construction sequencing and contractor coordination. (5/07 - 1/09)

BNSF Bridges 5.8, 6.2, and 6.7 Structural Inspection, Load Rating and Structural Repairs - Project Manager/Field Inspector
Directed the comprehensive inspection and load rating analysis of these three structures over north Willamette Boulevard, north Lombard Street, and north Fessenden Street in Portland, OR. All three structures consist of a combination of deck plate girder spans and deck truss spans resting on either structural steel towers or concrete piers. Mr. Magistro also managed the follow-up project to design structural retrofits to increase the load capacity of these structures. (1/08 - 12/08)

BNSF Bridge 117.35 Electrical/Mechanical Rehabilitation - Project Manager
Responsible for the replacement of the drive system on this span drive vertical lift bridge over the Illinois River in Beardstown, IL. The project included replacing the existing central reducer, drive motors, auxiliary drive system, shafts, bearings, and couplings. (9/07 - 11/08)

Canadian Pacific Rail Bridge 283.27 Bearing Repair and Truss Jacking - Project Manager/Design Engineer
Responsible for design and detailing of jacking frames used to longitudinally jack two approach spans through trusses adjacent to this 360-foot swing span over the Mississippi River in La Crosse, WI. The project included construction sequencing and field assistance during construction. (5/07 - 12/07)

VDOT I-264 Berkley Bridge Rehabilitation - Design Engineer
Participated in the rehabilitation of a 4-leaf bascule bridge over the New Elizabeth River in Norfolk, VA, for VDOT. The project consisted of design and integration of a new drive system and machinery on top of an existing system of equipment and machinery. The design includes two complete designs to accommodate the original 2-leaf bascule built in 1950 and the second bascule pair built in 1992. Mr. Magistro's responsibilities included design of the new mechanical equipment, as well as structural retrofits required for installation of the new equipment. (6/06 - 9/07)

BNSF Abo Canyon Double Track Capacity Design Project - Lead Bridge Engineer
Responsible for bridge layouts, design, quantity calculations and cost estimates for nine bridge structures along a 5-mile stretch of second mainline track for the Burlington Northern Santa Fe (BNSF) Railroad through Abo Canyon, NM. (10/04 - 3/06)

BNSF Bridge 0.80 Emergency Stringer Replacement - Project Manager/Design Engineer
Supervised the emergency replacement of eight stringers in the movable span floor system of this 450-foot swing span over the Missouri River in Kansas

City, MO. The scope of the project also included shop inspection during fabrication of the fracture critical stringers. (8/04 - 10/04)

Canadian Pacific Rail Bridge 283.27 Span Alignment Lock Design - Project Manager

Led the design and detailing of a new span alignment and span locking device for this 360-foot swing span over the Mississippi River in La Crosse, WI. The project included structural modifications to the approach span where the new device was located. (12/03 - 10/04)

BNSF Bridge 37.0 Fender Replacement - Project Manager/Design Engineer

Oversaw design and detailing of a new fender system for the 260-foot swing span over the Snohomish River in Everett, WA. (5/03 - 4/04)

BNSF Bridge 14.2 Pier Rehabilitation - Project Engineer

Assisted in development and design of rehabilitation details for the rest pier, bridge bearings, lift tower structural support steel, and end floorbeam top flange replacement for this bridge located near Steilacoom, WA. The rest pier was rehabilitated and the live load bearing was replaced while maintaining both rail and navigation traffic. (3/02 - 11/03)

BNSF Richmond Turntable Rehabilitation - Project Engineer

Responsible for design of the new mechanical components in the rehabilitation of this 110-foot turntable structure in Richmond, CA. The project included design and details for new end trucks, new enclosed gear reducer to replace open gear set, new shafts and bearings, and new structural supports. (8/02 - 5/03)

EJE Railway Bridge 728 Rehabilitation - Design Engineer

Responsible for the mechanical rehabilitation of this Scherzer single-leaf rolling bascule span over the East Chicago Canal in Gary, IN, for Elgin, Joliet and Eastern (EJE) Railway. The project included replacement of the drive motor and central reducer, and all associated shafts, bearings, and couplings; installation of a new auxiliary motor and clutch; and upgrade of the control system. Mr. Magistro was also responsible for the design of the structural support system rehabilitation for new mechanical components, and construction sequencing and field assistance during construction. (4/01 - 5/03)

CSX Transportation Bridge L653.4 Span Replacement - Project Engineer

Participated in the inspection to evaluate the existing condition of the movable span for purposes of the United States Coast Guard Cost Apportionment. Mr. Magistro was responsible for the new bridge deck details, including timber ties, steel ties, and rail joints for this on-line swing span replacement with a new 360-foot vertical lift span over the Mobile River near Hurricane, AL. (5/00 - 2/03)

Elgin, Joliet and Eastern Railway Bridge 198 Inspection and Rehabilitation - Design Engineer
Led the mechanical rehabilitation of this skewed 306-foot-long tower drive vertical lift bridge over the Des Plaines River in Joliet, IL. This Elgin, Joliet and Eastern (EJE) Railway project included the replacement of an open gear set with an enclosed gear reducer, as well as the replacement of all impacted shafts, pinions, bearings, and couplings. Mr. Magistro was also responsible for the design of new mechanical system components, construction sequence, and field assistance during construction. (5/01 - 11/02)

BNSF Bridge 1136.3 Rail Joint Replacement - Design Engineer
Responsible for the replacement of the rail joints on this Abbott Style single-leaf bascule bridge over the Old River in Orwood, CA. The project also involved installation of steel ties under the new joints, replacement of one approach span, and rehabilitation of the span lock. Mr. Magistro's responsibilities also included engineering design, plan production, and field assistance during construction. (5/00 - 4/01)

MICHAEL MATELIS

Mr. Matelis is a Senior Director in the Network Industries Strategies ("NIS") Group of FTI Consulting, Inc., an economic and consulting firm with offices located at 1101 K Street, NW, Washington, D.C. 20005. Mr. Matelis is sponsoring portions of Sections III-C of CSXT's Reply Evidence related to evidence of missing trains. Mr. Matelis has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Matelis holds a Bachelor of Arts degree in economics from the University of North Carolina at Chapel Hill. He provides financial and economic consulting services to the transportation, energy, and telecommunications industries. Mr. Matelis has led efforts assessing data quality and performed complex economic and financial analysis.

Mr. Matelis previously worked as a management consultant for a number of government and private organizations, providing quantitative analysis.

Mr. Matelis's complete curriculum vitae is attached.

VERIFICATION

I, Michael Matelis, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Michael Matelis

Michael Matelis

Executed on this 14 day of July 2014.

Michael Matelis

Senior Director – Economic Consulting

michael.matelis@fticonsulting.com

FTI Consulting
1101 K Street, NW
Suite B100
Washington, DC 20005
Tel: (202) 312-9100
Fax: (202) 312-9101

Education
BA in Economics from University of North Carolina at Chapel Hill

Michael Matelis is a Senior Director in the Network Industries Strategies group of the FTI Economic Consulting group, located in Washington, D.C. Mr. Matelis provides financial and economic consulting services to the transportation, energy and telecommunications industries.

Mr. Matelis has developed and managed complex database systems incorporating data from various sources to generate enterprise-level information for analysis. He has worked with clients to define data requirements and identify appropriate data sources for various projects. He has led efforts assessing data quality – ensuring proper configurations, linkages, and values contained within data sets. He has performed economic and financial analysis and developed methodologies to model operations, examine costs, establish pricing rates, and ensure compliance with regulations.

Prior to joining FTI Consulting, Mr. Matelis worked as a management consultant leading projects specializing in analytical and data-driven efforts for various government and private organizations. These efforts included: creating data collection and analysis tools, developing and analyzing performance measures, designing and implementing national surveys, and developing information systems. His core skills include quantitative analysis, data management, and information system development.

TESTIMONY

Surface Transportation Board

August 1, 2011	Docket No. 42125, E.I. DuPont De Nemours and Company v. Norfolk Southern Railway Company, Norfolk Southern Railway Company's Reply to Second Motion to Compel, Joint Verified Statement of Benton V. Fisher and Michael Matelis

MARK A. PETERSON

Mr. Peterson is a Vice President and Architect with STV, a professional firm offering engineering, architectural, planning, environmental, and construction management services with offices located at 1055 West Seventh Street, Suite 3150, Los Angeles, California 90017. Mr. Peterson has more than 25 years of experience in the design and oversight of new and renovated transportation, healthcare, and laboratory facilities. Mr. Peterson is sponsoring portions of Section III-F of CSXT's Reply Evidence relating to Facilities. Mr. Peterson has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Peterson's transportation work has included master planning, programming, and design for vehicle maintenance, service and inspection, parking, operations and administrative, and communications facilities for state and regional transit agencies as well as for railroads. Mr. Peterson holds a Bachelor of Arts, Architecture from Washington University and is a member of the American Institute of Architects.

Mr. Peterson's resume with additional project experience is attached hereto.

VERIFICATION

I, Mark A. Peterson, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Mark A. Peterson

Executed on this 16th day of July 2014.

Mark A. Peterson, AIA

Architect
Vice President

Mr. Peterson is an architect and project manager with more than 25 years of experience in the design and oversight of new and renovated transportation, healthcare, and laboratory facilities. His transportation work has included master planning, programming, and design for vehicle maintenance, service and inspection, parking, operations and administrative, and communications facilities for state and regional transit agencies and railroads. Mr. Peterson also has particular expertise providing design for healthcare facilities, as well as for life safety systems and ADA compliance upgrades. He brings a high degree of knowledge and experience in the resolution of challenging construction projects within operating facilities.

Office Location
Los Angeles, CA

Date joined firm
12/3/07

Years with other firms
23

Education
Bachelor of Arts, Architecture; Washington University (1984)

Professional Registrations
Architect: California (1994/#C25229/exp. 5/31/13)

Memberships
American Institute of Architects (AIA), Los Angeles Chapter

Project Experience

HEALTH & SCIENCE

LACDPW Olive View – UCLA Medical Center - Architect-of-Record
Provided architectural oversight for the design of a new cleanroom and anteroom at the Olive View – University of California, Los Angeles (UCLA) Medical Center in Sylmar, CA. Under an architectural and engineering design services task-order contract with the Los Angeles County Department of Public Works (LACDPW), STV designed a renovation of an existing pharmacy area at this 377-bed hospital to accommodate an International Organization for Standardization (ISO) Class 5 intermediate cleanroom for intravenous compounding and chemotherapy, an ISO Class 7 anteroom, and a Talyst machine. Mr. Peterson oversaw design plans, which encompassed architectural, mechanical, and structural disciplines. As part of this complex renovation, the firm designed a standalone HVAC system with separate exhaust; electrical, plumbing, and fire protection system improvements; a horizontal and vertical flow hood; and upgrades to the pharmacy restroom, in accordance with ADA requirements. STV also designed the anchorage for three carousel prescription dispensers planned for installation and verified that the pharmacy's floor could support their load, strengthening the floor beams, as required. The California Office of Statewide Health Planning and Development approved STV's plans for the project. (7/08 - 7/10)

VA Building 99 Seismic Upgrade and HVAC Systems Replacement - Architect
Led initial building evaluation and formulation of the design approach, phasing, and costing for the seismic retrofit of a single-story, long-term U.S. Department of Veterans Affairs (VA) care facility in Sepulveda, CA. The project scope for this occupied 50,000-sf facility included full replacement of

the HVAC system, slab-on-grade and foundation wall moisture sealing, and replacement of all interior finishes. (1996)

VA Long Beach Campus ADA and Life Safety Systems Upgrades - Project Architect
Provided design for the upgrade of numerous structures for compliance with ADA guidelines and life safety codes on the U.S. Department of Veterans Affairs (VA) campus in Long Beach, CA, as part of an open-ended contract. The project included initial evaluation of deficiencies within fire-rated existing systems, reporting, and the development of construction documents detailing corrective measures. (1995)

U.S. FamilyCare Medical Center Expansion - Project Manager/ Architect
Provided design for the seismic upgrade and expansion of a 101-bed acute care facility in Montclair, CA. The project goals included a seismic upgrade and market-driven expansion of the hospital from 72,000 to 100,000 sf while avoiding impact to the census or services at any time. Mr. Peterson's design included phased upgrades to all departments and complete redesign of the site. All mechanical and electrical systems were replaced to comply with current standards, including life safety and critical branch power requirements. (1993)

LABORATORY & HIGH-TECH

NASA Jet Propulsion Laboratory Improvements - Contract Manager/Project Architect
Responsible for the administration and direction of projects under an open-ended contract with the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory in Pasadena, CA. Projects typically ranged from $700,000 to $1.5 million and included optical, flight hardware development, and super-computing laboratories; administrative and records archiving units; and cafeterias. Other projects included clean rooms, specialized utility delivery requirements, and addressing security issues. (1995 - 2007)

MULTIMODAL

BNSF Railway Intermodal and Automotive Facility Expansions - Project Manager/Project Architect
Led design for numerous rail and building projects in Los Angeles associated with a $150 million expansion of the world's largest intermodal facility. One project was the complete redesign of secure parking facilities, which included security systems; gate reconfiguration; and supporting administrative, repair, and mechanical structures. Mr. Peterson helped develop a complete master plan corresponding to the rolling 5-year goals of the BNSF Railway. He was responsible for the programming and design of a

new 30,000-sf operations and administrative command center serving the nearly 500 employees and contractors at the Los Angeles facility, as well as a new, secure communications hub built to emergency services standards in Stockton, CA, to provide connectivity between operations centers in Los Angeles; Fort Worth, TX; and Northern California. Mr. Peterson assumed a similar design role for the BNSF Memphis Intermodal Yard Expansion, which was one of the first in the nation to employ European wide-span crane technology. (1995 - 2007)

POLA/BNSF Railway Southern California International Gateway - Task Manager/Project Architect

Worked with the Port of Los Angeles (POLA) and BNSF Railway to plan a new intermodal facility, the Southern California International Gateway (SCIG), on a sustainable design basis in Los Angeles. The SCIG will provide much-needed near-dock capacity with direct access to the Alameda Corridor, a 20-mile-long, grade-separated rail line between the ports and downtown Los Angeles. The design, which progressed to the Environmental Impact Report process and is presently awaiting approval, is based on minimizing the environmental footprint and employs highly efficient wide-span cranes capable of serving up to eight intermodal tracks. The cranes are electric and use cogeneration of power in their operation. All hostling equipment will utilize either compressed natural gas or liquefied natural gas to reduce emissions. Yard lighting is designed to virtually eliminate light trespass and utilizes highly efficient lamps. Yard operations are designed to provide the utmost in efficiency and further reduce hostling operations and third-party truck dwell time. This efficiency also reduces the overall area of impact for stormwater management. (2005)

TRANSPORTATION FACILITIES

WRTA Bus Maintenance, Operations, and Storage Facility - Lead Designer

Overseeing architectural design for the construction of a new vehicle maintenance, operations, and storage facility in Worcester, MA, for the Worcester Regional Transit Authority (WRTA). The 2-story, 150,000-sf facility will have a capacity for 125 vehicles and space for 155 employees. It will include bus lifts, wash and fueling bays, a body shop and paint booth, fluid dispensing systems, general parts and tire storage operations and retrieval, operations and maintenance personnel welfare areas, bus and van dispatch space, and office and administration spaces. (7/11 - Present)

City of Los Angeles LADOT CNG Fueling and Bus Maintenance Facility Feasibility Study - Project Manager

Leading a feasibility study of three locations for a proposed new Los Angeles Department of Transportation (LADOT) fueling and maintenance facility for its 60-vehicle compressed natural gas (CNG) Downtown Area Short Hop bus fleet, with layover area for up to 64 Commuter Express buses. The facility will include vehicle storage, CNG fueling stations, maintenance bays, office space, parking for employees and non-revenue vehicles, welfare facilities, and a dispatch center. In addition to determining minimum site size and configuration, the conceptual feasibility evaluation will include environmental and accessibility requirements, capacity for future expansion, general floor plans, rendered elevations, and cost estimates. Issues Mr. Peterson is addressing include the maneuvering and parking needs of the 30-foot-long and 40-foot-long vehicles, traffic patterns and impacts in and around the sites, and the availability of adequate quality natural gas, as well as integration with and support for planned future high-speed rail service in the region. (8/11 - Present)

Omnitrans East Valley Vehicle Maintenance Facility Modifications - Project Manager

Leading architectural and engineering services for project development — including preliminary engineering and final design; engineering support services during construction; and development of plans and procedures for start-up, commissioning, operations, and maintenance — of the Omnitrans East Valley Vehicle Maintenance Facility in San Bernardino, CA. The facility needs to be modified to accommodate the introduction of up to 23 sixty-foot-long articulated buses associated with the sbX bus rapid transit project. All maintenance services must remain operational throughout the construction period. (1/11- Present)

CHSRA Los Angeles-to-Anaheim Project EIR/EIS - Facilities Programming and Design Manager

Leading the team for preliminary design of three stations and a rolling stock vehicle maintenance facility for a 30-mile high-speed train corridor between Los Angeles and Anaheim, CA, for the California High Speed Rail Authority (CHSRA). The maintenance facility will provide Class 1-3 vehicle maintenance services for 28 trainsets daily. The contextual nature of the proposed facilities is seen as critical in terms of aesthetic, scale, massing, and traffic impact. Early on, Mr. Peterson led the team's effort to generate projections for vehicle design, operations, ridership numbers, and demographics: parameters that CHSRA had not yet defined. These projections distilled down into sensible design solutions. Despite significant changes to the project due to immense political pressures, Mr. Peterson's leadership enabled the team to complete deliverables on time. Currently, design is progressing toward a 30% design deliverable in support of the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the design-build procurement package. Mr. Peterson is meeting and coordinating with numerous agencies and cities along the corridor. He is also addressing the complex integration with the proposed Anaheim Regional Transit Intermodal Center. (6/09 - Present)

SCRRA On-Call Professional Engineering Design Services - Project Manager

Directed design to 30% and preparation of design-build bridging documents for the consolidation of several Southern California Regional Rail Authority (SCRRA) properties into a single campus in Pomona, CA. The campus consists of a 64,000-sf maintenance support facility and a 28,000-sf train control center (TCC), which houses a modified Metrolink operations center that will remain online during the project as a back-up to the new facility. Upon approval at a public hearing, the project was praised by the City of Pomona Planning Commission as a "very attractive" building that will be an asset to the community. The TCC was designed according to the strict standards of California's essential services building regulations and includes a dispatch center and a significant data center. It will provide several modes of wireless communications including a microwave array and two cellular towers. The design team secured environmental clearances for the NEPA and the California Environmental Quality Act. The project also includes positive train control systems, which are mandated to be installed on all railroads in California by 2015. (2/09 - Present)

POLA Pacific Harbor Line Maintenance Facility - Project Manager
Managing the design of an 8,200-sf maintenance facility and a 5,000-sf prefabricated office building at the Port of Los Angeles (POLA) in Wilmington, CA, to accommodate the Pacific Harbor Line. The maintenance facility will provide two covered inspection pits, a fueling track, sanding facility, and an oil/water separator. In addition to the service areas, the building will house a storage area, machine shop, tool corral, break room, office area, locker room, and restrooms. The office building will house administrative offices, a dispatching center, support spaces, a conference room, and employee welfare spaces. The design for the $90 million project features a broad range of sustainable strategies and project-specific innovations to comply with the California Green Building Code. Due to uncertainty in the economy, the project has been put on-hold several times, after which Mr. Peterson has successfully regrouped the project team and gotten them back up to speed. As a result, STV's team has met all submittal deadlines in a timely and material fashion. (7/08 - Present)

OCTA Metrolink Capital Improvement Program Study - Project Manager
Oversaw a comprehensive assessment for the Orange County Transportation Authority (OCTA) of its 12 Metrolink commuter rail stations to evaluate current conditions and prioritize potential enhancements. STV's study provided a comprehensive inventory of station facilities and amenities, and highlighted issues associated with public safety; station accessibility; and ease of transfer between rail, bus, and other modes of surface transportation. Mr. Peterson and his team ranked the recommended improvements to the Metrolink stations based on priority and implementation timeframe. (11/11 - 1/12)

[consolidated description]
OCTA On-Call Design and Construction Support Services - Project Manager
Directed personnel, development of proposals, and fees and budgets for an on-call contract with the Orange County Transportation Authority (OCTA) for improvements to its Southern California bus maintenance facilities.

Projects included modifications to steam cleaning facilities to replace siding panels and lighting fixtures damaged by the corrosive environment; replacement of piping and structural elements in bus wash areas, and the design of a roof access ladder; the addition of an uninterruptible power system at a fuel building; upgrades to restroom and employee break rooms; and the addition of a mezzanine for parts storage. (12/07 - 11/09) [Client Contact: Sara Strader, Contract Administrator, (714) 560-5633]

[individual description]

OCTA Worker Fall Protection at Three Sites - Project Manager/Project Architect

Managed and led the design of new fall protection systems at the Orange County Transportation Authority (OCTA) Santa Ana, Garden Grove, and Anaheim, CA, bus maintenance facilities to allow OCTA personnel to safely access the bus roofs. The design met the needs for servicing several bus designs, which range in length from 40 feet to 60 feet. The primary challenge was retrofitting fall protection systems into the repair bays to allow for effective bus maintenance while limiting the impact on existing overhead utility systems. In addition, Mr. Peterson's team of designers had to keep the number of support system types to a minimum to reduce the cost of the installations. (12/07 - 6/08)

Metro Union/Patsaouras Plaza Busway Station - Architect

Coordinated with project design architects and the engineering group to define the aesthetics for and functionality of a new bus station at Patsaouras Plaza adjacent to Union Station and US 101 in Los Angeles for the Los Angeles County Metropolitan Transportation Authority (Metro). Mr. Peterson participated in a number of design charrettes and worked with Metro to develop the signage and wayfinding design package. He also participated on the art component selection committee, which entertained proposals from 120 internationally recognized artists. (10/09 - 7/10)

[consolidated description]

NCTD On-Call Projects - Project Manager

Oversaw design for a number of on-call engineering, planning, and design projects for the North County Transit District (NCTD) in San Diego County. Projects included development and site adaptation of a bus shelter prototype design, modifications to the Oceanside Transit Center site, expansion of the East Division Maintenance Facility, a replacement study for the Fallbrook Junction Maintenance-of-Way Facility, the Vista Del Ray Transit Center, the remodel of the 810 Mission Street office's board rooms, and security office renovations and roof replacement at the Oceanside Transit Center. (2000 - 2009)

[individual description]

NCTD Bus Shelter Prototype - Project Manager

Worked with a prefabricated bus shelter manufacturer to develop a prototypical design for bus shelters to be deployed at several transit centers for the North County Transit District (NCTD) in San Diego County. These large shelters are designed to provide shade and cover from the weather for up to 30 passengers. The design provides the basic canopy elements and is then clad to work with the established aesthetic and context of the transit centers. Mr. Peterson's responsibilities include assisting the NCTD with site layout of the canopies for each location. (2007 - 2009)

[individual description]

NCTD Oceanside Transit Center Modifications - Project Manager

Managed the completion of several North County Transit District (NCTD) projects to update this intermodal facility in Oceanside, CA. Tasks included new wayfinding and signage installation to assist the public in locating transit center services and to access the various rail and bus lines that serve the facility. Additional services included new landscape and hardscape design, new site lighting, the addition of emergency power, structural evaluation of canopies and other structures, and a complete renovation of the transit center's security center. Mr. Peterson also oversaw the renovation of the center's canopies, including nearly 1 acre of polycarbonate panels. (2007 - 2009)

[individual description]

NCTD East Division Bus Maintenance Facility Expansion - Project Manager/Project Architect

Provided project design and management for the expansion of this North County Transit District (NCTD) facility in Escondido, CA, to accommodate compressed natural gas-fueled buses. The project involved the addition of eight new bays and the renovation of the existing maintenance building to provide support services and storage for maintenance operations. Challenges included maintaining maintenance operations through construction via phasing, and developing a site layout that could accommodate the increased bus count and provide safe and adequate circulation to service facilities without an increase in available property. (2004 - 2007, 1/08 - 5/09)

[individual description]

NCTD Sprinter DMU Maintenance Facility - Construction Manager

Provided personnel management and technical review associated with the construction of the $25 million North County Transit District (NCTD) Sprinter Maintenance Facility in Escondido, CA. The facility was built to house operations and maintenance functions for 12 diesel multi-unit (DMU) commuter vehicles serving communities from Oceanside to Escondido. (2006)

[individual description]

NCTD 810 Mission Avenue Board Room Remodeling - Project Manager

Managed this project to remodel the public board room at the North County Transit District (NCTD) offices in Oceanside, CA. The design also included a private, break-out meeting room adjacent to the main conference area. Mr. Peterson led the design for revised casework for board members, upgrades to IT and communications systems, HVAC system and lighting modifications, and furnishing specifications. (2004)

[individual description]

NCTD West Division Fuel System Replacement - Project Manager
Oversaw design for the removal of underground diesel and gasoline storage tanks for North County Transit District (NCTD) buses and other non-revenue vehicles at the West Division Bus Maintenance Facility in Oceanside, CA. The final design included several aboveground diesel fuel and one gasoline tank as well as new fuel distribution and management systems. (2004)

[individual description]
NCTD San Luis Rey Transit Center - Project Manager
Worked with the North County Transit District (NCTD) and a transit-oriented development (TOD) developer to integrate bus services into a new mixed-use development in Oceanside, CA, that includes multifamily residences, offices, and other business functions. The design includes pedestrian and vehicular circulation to serve 12 bus bays, a ticket office with restrooms, and 4 covered shelters with seating and restroom facilities. Particular effort was dedicated to the interface with the TOD and its aesthetic and to the site's vertical challenges for accessibility. (2003)

SJRRC Altamont Commuter Express Authority Equipment Storage and Maintenance Facility - Project Manager
Oversaw the design of a new service and inspection facility in Stockton, CA, for the San Joaquin Regional Rail Commission (SJRRC) Altamont Commuter Express rail service. Mr. Peterson managed a team of approximately 100 people, including various subconsultants. The site is bordered to the north by a residential community, and Mr. Peterson worked throughout the development of the project to mitigate the massiveness of the facility through design, coordinating closely with the City of Stockton and the neighboring community. The project is also the first vehicle maintenance shop of its type pursuing LEED® certification and includes a 110,000-sf shop with areas for maintenance, wheel truing, fueling, service, and inspection; 12,000-sf of office and welfare areas; and a 1,840-sf trainwasher. The industrial nature of the facility, which services diesel locomotives, made it an unusual LEED candidate, and many of the sustainable design techniques considered conflicted with building codes. Despite these challenges, Mr. Peterson proposed several sustainable techniques including water reclamation from industrial processes for reuse in pressure washers and as grey water in toilets, and strategies that use automatic processes to minimize energy consumption. One such process uses air quality monitors to control exhaust fans to run as-needed. Other sustainable strategies include photovoltaic panels, rainwater harvesting for irrigation, and drought tolerant plants. Mr. Peterson suggested significant design changes to the client that would have netted cost savings, had they been adopted. This LEED-registered project is pursuing Silver certification. (12/07 - 6/09)

Amtrak Seattle Interim Improvement - Project Manager
Managed the proposed modification of track configurations in a Seattle rail maintenance facility in response to a mainline shift by BNSF Railway and to improve storage. This shift also required modifications to the existing drop table and drop table building. Mr. Peterson developed a plan to separate the

stormwater and sewage, which commingled in an outdated drainage system. This involved massive underground water storage tanks. He also customized the preliminary design so that all modifications satisfied the initial project requirements as well as the needs of anticipated build outs in the future. Using a highly successful design-build team approach, Mr. Peterson delivered plans that met all project goals. However, the project was never constructed due to budget constraints. (12/07 - 3/09)

Amtrak Southampton Drop Table Study - Project Manager
Oversaw the design of several studies to add a new drop table and progressive maintenance track to a maintenance facility serving the northern terminus of Amtrak's Acela service in Boston. The project posed several challenges, including a severely constrained site, a high water table, and differential settlement issues. Mr. Peterson helped develop innovative foundation concepts to minimize construction impacts to yard operations and capacity. To address the storage shortage on the site, the team developed a design scheme for storing full locomotive truck sets on a mezzanine level created in the drop pit. The project also required a comprehensive fire response and suppression system plan with the Boston Fire Department. There was no existing fire plan prior to the study and the department initially wanted a fire access road constructed adjacent to the facility. Through Mr. Peterson's coordination efforts and the assistance of a property risk management consultant, the fire department agreed to a standpipe system. The standpipe was a much safer solution, considering the extensive catenary system, and created minimal impact to yard operations compared to the fire access road originally requested. (5/08 - 1/09)

Arlington County Department of Environmental Services Division of Transportation ART House Master Plan - Project Director
Performed a concept study under an on-call contract for a temporary and subsequent permanent bus maintenance facility in Crystal City, VA, to house the Arlington Transit (ART) bus fleet, as a task under an on-call contract for the Arlington County Department of Environmental Services Division of Transportation. The project, which included planning, civil, architectural, and engineering services, was accomplished in four phases. Mr. Peterson assisted in site assessment, site and facility design, and vehicle circulation analysis. Subsequent to the original study, the master plan was updated to accommodate an additional land purchase and a larger fleet. (2006 - 2009)

UPRR Intermodal and Welfare Facility Projects - Principal-in-Charge/Project Architect
Responsible for overseeing design and providing overall direction for numerous improvements projects at Union Pacific Railroad (UPRR) facilities. Mr. Peterson led the design efforts to improve the UPRR intermodal yard in Salt Lake City. Improvements included new automated gate system inbound and outbound gates with canopies, an office and gate control building, welfare facilities, and hostler facilities. He also served as the principal-in-charge of architectural and engineering services for two new welfare and office buildings at UPRR intermodal yards in Southern

California and a new maintenance-of-way crew building in Oxnard, CA. Other projects included replacement of HVAC systems at the UPRR Los Angeles Police Department building; a new yard crew facility in Martinez, CA; and a warehouse expansion in Roseville, CA. (2004 - 2007)

Amtrak Passenger Platform Expansion - Project Manager
Worked with Amtrak, BNSF Railway, and the City of Hanford to develop an 800-foot second passenger platform to support a second mainline in Hanford, CA. Platform and shelter designs reflected the historic context of the Hanford Depot and interfaced with the city's adjacent intermodal transit facilities. The 7th Street at-grade crossing and pedestrian safety were major considerations in the design solution. (6/04 - 6/05)

NCTD Fallbrook Junction MOW Facility Replacement - Project Manager
Oversaw preliminary design and pricing for the replacement of the North County Transit District (NCTD) maintenance-of-way (MOW) building and yard north of Oceanside, CA. The study looked at several sites to satisfy environmental impact requirements and ultimately was developed to conform to a specific site. The facility included four vehicle bays, welfare facilities for business operations and employees, a partially covered spur track, and parking and material laydown areas. (2004)

Caltrans/Amtrak National City Car Service Facility and Passenger Platform - Project Manager
Led the design of a service and inspection facility for Amtrak trains at a layover storage yard in National City, CA. The facility includes a 2-track inspection service and fueling facility designed for joint use with BNSF Railway. On-site improvements for this joint California Department of Transportation (Caltrans)/Amtrak project also included storage for six trainsets and a train wash, administrative shop, and storage building. The project also entailed the design of a new passenger platform and trans-load dock, as well as 6 miles of track improvements through downtown San Diego. Complexities of this project included the number of rail lines servicing the area as well as working with the city to get the facility to conform with its vision of growth for the community. (1999)

ROBERT C. PHILLIPS

Mr. Phillips is Vice President of the Rail Division of STV, a professional firm offering engineering, architectural, planning, environmental, and construction management services. Mr. Phillips has more than 35 years of experience with track design and maintenance, grade crossings, bridge construction, construction management of rail projects, maintenance and protection of traffic, and the installation of fiber-optic cable within railroad rights-of-way. Mr. Phillips is sponsoring portions of Section III-F of CSXT's Reply Evidence relating to Earthwork and Bridges. Mr. Phillips has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Phillips is responsible for overseeing and directing STV's commuter and freight rail planning and engineering projects. Mr. Phillips joined STV in 1994. Prior to his employment with STV, Mr. Phillips worked for Norfolk Southern in various capacities for 12 years, where he gained operating experience in engineering, track maintenance, and train operations. His responsibilities included managing track maintenance, supervising and training train crews, ensuring operating rules compliance, and investigating accidents and injuries. Mr. Phillips holds a Bachelor of Science, Civil Engineering from Virginia Polytechnic Institute and a Master of Business Administration from Averett College.

Mr. Phillips' complete curriculum vitae, with additional project experience, is attached.

VERIFICATION

I, Robert C. Phillips, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Robert C. Phillips

Executed on this 10th day of July 2014.

Robert C. Phillips, P.E.

Vice President/Project Manager

Mr. Phillips, Vice President of the Rail Division, is responsible for overseeing and directing STV's freight rail planning and engineering projects. He has more than 35 years of experience with track design and maintenance, grade crossings, bridge construction, construction management of rail projects, maintenance and protection of traffic, and the installation of fiber-optic cable within railroad rights-of-way. Mr. Phillips worked for Norfolk Southern Railway (NS) in various capacities for 12 years, during which he gained operating experience in engineering, track maintenance, and train operations. His responsibilities included managing track maintenance, supervising and training train crews, ensuring operating rules compliance, and investigating accidents and injuries.

Office Location
Charlotte, NC

Date joined firm
6/2/94

Years with other firms
19

Education
Master of Business Administration; Averett College (1992)

Bachelor of Science, Civil Engineering; Virginia Polytechnic Institute (1975)

Professional Registration
Professional Engineer: Pennsylvania (2000/#PE056524-E/exp. 9/30/13) and Virginia (1997/#030702/exp. 2/28/13)

Project Experience

BRIDGES

NCDOT NS over U.S. 220 Bridge Replacement - Field Engineer
Provided construction field coordination between NS and the North Carolina Department of Transportation (NCDOT) for the replacement of a Norfolk Southern single-track, single-span railroad bridge with a double-track, 4-span railway bridge over U.S. 220 in Price, NC. (1996 - 1997)

NCDOT NS over U.S. 401 Bridge Replacement - Field Engineer
Handled the construction field coordination between NS and the North Carolina Department of Transportation (NCDOT) for replacement of the Norfolk Southern Bridge over U.S. 401 in Fuquay-Varina, NC. (1995 - 1996)

City of Greensboro Merritt Drive Improvements - Field Engineer
Performed construction observation for a detour bridge and replacement of the Norfolk Southern railroad bridge on Merritt Drive in Greensboro, NC. (1995 - 1996)

VDOT Norfolk Southern over U.S. 250 Bridge Replacement - Project Manager
Provided construction field coordination between NS and the Virginia Department of Transportation (VDOT) for the construction of a temporary detour bridge and a new through-plate girder replacement railroad bridge in Waynesboro, VA. (1994 - 1995)

RAIL

NS Construction Management for Rickenbacker, Birmingham, and Charlotte Airport Intermodal Yards - Senior Project Manager
Assembling and administering construction management (CM) teams for three new NS regional intermodal facilities to handle increases in rail container traffic and to accommodate the classification of double-stack container trains. Each team is managing the construction of $100 million projects at new site locations. Construction includes grading and drainage, classification tracks, storage tracks, new sidings, concrete loading and unloading pads, acres of roller compact concrete for storage, truck gates, yard offices, and crew facilities. CM services include plan review, progress reports, inspection reports, maintenance of contractor's schedule, monthly pay estimates, and project closeout verifications and documentation. (5/09 - Present)

Union Pacific Railroad Miscellaneous Engineering Services – Principal-in-Charge
Managing on-call contract services for an ongoing list of 40 current structural projects from Utah to Chicago for Union Pacific Railroad. Mr. Phillips is overseeing several types of engineering projects, including bridge deck replacements and repair, new track construction, construction and design reviews, and construction oversight. The projects include work on approximately 25 rail bridges. (2006 – Present)

NS On-Call Services Contract - Principal-in-Charge
Responsible for plan review and construction engineering on an on-call, as-needed basis for more than 50 projects involving proposed roadway, bridge, and retaining wall construction affecting railway facilities. Projects to date have included overseeing construction of overhead bridges, underpasses, floodwalls, utility crossings, parallel construction of utilities, roadways, bikeways, and grade crossings. (2/04 - Present)

CSX Transportation General Engineering Consultant Services Contract - Principal-in-Charge
Serving as the point of contact for administration of contract services and appointment of project managers. Mr. Phillips is overseeing track and bridge design and construction, plan review, construction management, and inspection services on an on-call basis for several projects involving proposed roadway, bridge, and retaining wall construction affecting railway facilities throughout the 23-state CSXT system. His contributions so far include the design and construction of bridges, tracks, yards, and capacity-related projects. Public projects includes bridge, track, floodwalls, utility crossings, parallel construction of utilities, roadways, bikeways, and grade crossings. (2/04 - Present)

STB Railroad Coal Rate Case Litigation Cost Assessments - Project Manager
Leading a team assembling the planning, engineering, and construction costs to build a hypothetical contemporary operating railroad. Services include a complete itemization, justification, and documentation of all transportation,

material, and labor construction costs associated with a contemporary construction costing. All submittals were entered as evidence to the Surface Transportation Board (STB) to justify contested rates for several coal rate cases. Cost assessments included major earthwork, bridge and culvert construction, track, communications and signalization, engineering design, construction management, facilities, material costs and logistics, mobilization, and contingencies. Cases included Norfolk Southern (NS) vs. Duke Energy, NS vs. CP&L, CSXT vs. Duke Energy, AEPCO vs. Burlington Northern Santa Fe (BNSF) and Union Pacific, Otter Tail vs. BNSF, AEP Texas North vs. BNSF, Seminole vs. CSXT, IPA vs. UP, DuPont vs. NS, TPI vs. CSXT, M&G vs. CSXT . (2002 – Present)

NS Heartland Corridor Clearance Improvements CM - Senior Project Manager

Oversaw this $191 million project to provide clearance improvements to 28 railroad tunnels and seven bridges on the 530-mile-long Heartland Corridor, which extends from Norfolk, VA, to Columbus, OH. Mr. Phillips' services included creating overhead bridge jacking plans to obtain vertical clearances, modifying slide fences, providing utility coordination, creating Stormwater Pollution Prevention Plans for tunnel portals, creating railroad-bridge lowering plans, and reviewing track designs. His construction management (CM) responsibilities also included conducting preconstruction meetings with contractors as well as weekly progress meetings, reviewing construction schedules, monitoring and documenting contractor work, reviewing monthly contractor pay estimates, and coordinating between the contractor and railroad forces. The project constituted an innovative public-private partnership venture between NS, various participating states, and the Federal Highway Administration. (4/07 - 12/10)

CSX Post-Hurricane Katrina/Rita Emergency Rail Reconstruction Project - Principal-in-Charge

Oversaw design and construction inspection for this $100 million emergency rail reconstruction project. Mr. Phillips was in charge of assessing damage to six major rail bridges ranging to more than 10,000 feet in length, developing repair or replacement plans, providing project management and construction management, and providing on-site inspection during the reconstruction period. In total, more than 75 miles of track was severely damaged and in need of emergency repair. (8/05 - 9/07)

NS Fiber-Optic Cable Installation - Project Manager

Responsible for the construction management of the installation of the fiber backbone along NS right-of-way along several routes: Cleveland, OH, to Boyce, VA, via Pittsburgh and Harrisburg, PA; Kalamazoo to Dearborn, MI; Dearborn, MI, to Toledo, OH; Toledo to Cleveland, OH; Cleveland, OH, to Buffalo, NY; and Cleveland, OH, to Pittsburgh, PA. Mr. Phillips oversaw staffing, permitting, inspection, safety operations, and final route approval. More than 100 managers and inspectors were involved in this major trunk line installation. Mr. Phillips also provided safety training, led NS operations meetings, attended weekly scheduling meetings, coordinated work trains and flagmen, and provided engineering reviews, change orders, and construction administration. (1999 - 2002)

NS Fiber-Optic Cable Installation in North and South Carolina - Project Manager
Coordinated with NS personnel and monitored the installation of fiber-optic cables belonging to Qwest Communications along several hundred miles of NS right-of-way in North Carolina and South Carolina. All phases of installation were involved, including plow train operations, long directional bores, and bridge attachments. Mr. Phillips provided periodic progress reports to NS and authorized minor changes from the approved construction plans to meet local conditions. He was also responsible for monitoring the railroad safety aspects of the installations. (1998 - 1999)

CSX System-Wide Grade Crossing Sign Project - Team Leader
Led one of seven teams for this project which required the installation of standard identification signs at every roadway grade crossing on the CSX Transportation system. During this process, STV completely updated the CSX grade crossing inventory list. (1997 - 1998)

CSX Systemwide Grade Crossing Inventory - Project Manager
Managed multiple teams to perform a grade crossing inventory encompassing more than 35,000 grade crossings on the CSX Transportation system in 21 states to meet a Federal Railroad Administration deadline. The project included deployment of multiple teams to inventory crossings, installing standard identification signs at every crossing to enhance safety and reporting, and updating CSX's inventory, including digital imagery of each crossing. All work was performed under a tight deadline of 180 days and completed a month ahead of schedule. (10/97 - 6/98)

NS Automobile Mixing Facility - Field Engineer
Oversaw shop inspection of structural steel at the fabrication plant in Colfax, NC, to be utilized in construction of this new automobile mixing facility in Shelbyville, KY. Mr. Phillips managed preliminary and final hydraulic/hydrologic design as well as railway, roadway, highway bridge, and railway bridge design. (1996)

Norfolk Southern - Trainmaster
Supervised train crews and yard personnel, ensured operating rules compliance, investigated all accidents and injuries, scheduled local train and yard engine operations, and trained employees on Federal Railroad Administration and NS operating rules through annual operating rule classes for track and transportation employees in Manassas and Danville, VA. (1981 - 1987)

Norfolk Southern - Track Supervisor
Supervised track maintenance crews and production gangs, responsible for track inspection program, and ensured Federal Railroad Administration (FRA) Track Safety Standards for Class of track were in compliance. Mr. Phillips maintained the NS Safety Program over assigned territory and investigated all accidents and injuries, scheduled track maintenance operations, and trained employees on FRA Track Safety Standards and NS track maintenance policy. (1975 - 1980)

RODNEY SMITH

Rodney Smith is Manager – Network Scheduling at CSX Transportation in the department of Service Design. Mr. Smith's office is located at 500 Water Street, Jacksonville, Florida 32202. Mr. Smith is sponsoring portions of Section III-C of CSXT's Reply Evidence related to rail operations. A copy of his verification is attached hereto.

Mr. Smith earned a Bachelor of Science in Business Management from the Appalachian State University. Mr. Smith has thirty three years of railroad experience including service planning, network planning, customer operations, training and development and field operations. Mr. Smith joined CSXT in 1989 as a yardmaster. Since then, he has held positions including Manager – Transportation Training; Manager of Planning, and Manager – Corridor Analysis. In his current position as Manger – Network Scheduling, Mr. Smith is responsible for planning functions including maintenance and accuracy in local and merchandise train service schedules. He oversees 330 shortline interchanges and is responsible for ensuring the feasibility of CSXT's operating plan. He assists in the coordination and design of new service and supports the service planning groups with forecasting of hazardous materials route risk analysis and systems development.

Mr. Smith's complete curriculum vitae is attached.

VERIFICATION

I, Rodney Smith, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Rodney Smith

Executed on this 3rd day of July 2014.

Rodney M. Smith

HOME ♦ 1532 Greenridge Circle West ♦ St. Johns, FL 32259 ♦ (904) 230-1695 ♦ Rodney_Smith@csx.com

Skill Summary

33 years railroad experience which includes Service Planning, Network Planning, Customer Operations (Field), Training and Development, and Field Operations. 2011 Chairman's Award of Excellence winner as part of the Hump Yard Simulation Team. Skilled in business process improvement methodologies. Possess strong business acumen and proven problem solving skills. Excellent communication and presentation skills as well as a good track record of internal and external customer satisfaction.

Education

Bachelor of Science, Business Management, Appalachian State University, 1980

Professional Experience

Manager Network Scheduling July 2011 - Present
CSX Transportation, Service Planning, Jacksonville, FL

- Responsible for planning functions including maintenance and accuracy in local and merchandise train service schedules
- Share in responsibilities for 330 shortline interchanges as well as all the Class I railroads where we perform interchange activities which includes four major gateways which process in excess of two million rail cars received or delivered each year
- Assist in the coordination and design of new service
- Communicate with interline rail partners and RailInc to maintain industry-level ISA Repository and associated CSX interchange performance metrics
- Review Operating Plan for feasibility
- Support Service Planning with forecasting, TIH route risk analysis, and systems development (NBC, etc.)

Manager Corridor Analysis October 2009 – July 2011
CSX Transportation, Network Planning, Jacksonville, FL

- Responsible for developing and improving methodologies that enhance operating plan performance for both passenger and freight train operations.
- Provided operational expertise in the development of the Hump Yard Simulation Tool used to analyze operations at specific hump yard locations to determine true throughput and capacity by running simulations using factual information and what-if scenarios which is not available today
- Performed yard capacity analysis at critical locations that led to strategic infrastructure investment to prepare for future growth
- Developed corridor plans and project synergies for inclusion in Line Capacity Capital Plans
- Provided leadership to the team by utilizing my field experience and system knowledge

Manager of Planning July 2000 - October 2009
CSX Transportation, Service Planning, Jacksonville, FL

- Provided expertise in developing and implementing the One Plan
- Developed and maintained the Network Operating plan for designated territories and divisions
- Managed day to day tasks of problem solving related to operating plan issues and failures
- Assisted other managers in the department by providing them with my expertise in problem solving skills and analysis
- Coordinated with field personnel operating plan changes that would improve overall operations and efficiencies
- Monitored daily activities to ensure the operating plans were effective and efficient

Manager Transportation Training April 1998 - July 2000
CSX Transportation, Training and Development, Jacksonville, FL

- Created and implemented training materials for the Conrail Acquisition
- Provided training to over 150 former Conrail employees leading to a successful implementation of our systems on Day One
- Supervised 5 Training Officers who were responsible for delivering training on CSX Mainframe Applications relative to the job responsibilities of Field Transportation Officers and Yardmasters on the former Conrail properties
- Supported CSX Management Trainee New Hire and Yardmaster New Hire programs by providing classroom training to equip them with the proper tools and skills to perform their jobs safely and effectively

Assistant Trainmaster/Trainmaster April 1995 – April 1998
CSX Transportation, Hamlet, NC

- Managed train operations within Hamlet Terminal
- Coordinated movement of trains with various departments in Operations Center in Jacksonville, FL
- Provided leadership to peers and contract employees concerning safety performance and programs
- Made daily tactical decisions in accordance with management goals of Safety, On-Time Train Performance, Right-Car Right-Train, and proper Customer Service

Yardmaster/Yardmaster Trainer July 1989 - April 1995
CSX Transportation, Florence, SC and on Florence Division

- Developed understanding of corporate goals and strategies of CSX Corporation, as well as its subsidiary CSX Transportation
- Met with various departments within CSX Transportation to gain knowledge of synergy needed to run an efficient, safe, and profitable Class 1 railroad
- Began in-depth on-the-job training at various locations to become a qualified and knowledgeable field officer of the Transportation Department

Technical Skills

- Excellent Microsoft Office Suite skills
- Excellent CSX Mainframe skills
- Proficient in Focus based programs
- Excellent Business Objects skills
- SME for ITS application used in Service Planning and Engineering
- Experienced in ACT (Algorithmic Class Tracking)
- Experienced in MultiRail Freight Edition
- Proficient in TFA (Traffic Flow Analyzer)

STUART SWEAT

Stuart Sweat is Director - Scheduling and Resource Planning for CSX Transportation Mr. Sweat's office is located at 500 Water Street, Jacksonville, Florida 32202. Mr. Sweat is sponsoring portions of Section III-C of CSXT's Reply Evidence related to MultiRail. A copy of his verification is attached hereto.

Mr. Sweat holds a Bachelor of Science in information science from the University of North Florida. Mr. Sweat joined CSXT in 1996. Mr. Sweat has over 17 years of experience in railroad operations research, service design, and resource planning functions. He has over fifteen years of experience working with MultiRail and has worked on CSXT's route risk analysis of hazardous commodities and capacity management. Currently, Mr. Sweat's responsibilities include the modeling of CSXT's operating plan using MultiRail Enterprise Edition. Mr. Sweat's other positions at CSXT include Director – Planning; Manager – Network Service Scheduling; and Operations Research Analyst.

Prior to joining CSXT, Mr. Sweat served in the US Naval Submarine Service from 1986 through 1994.

Mr. Sweat's curriculum vitae is attached.

VERIFICATION

I, Stuart Sweat, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

Stuart Sweat

Executed on this 10th day of July 2014.

802 Memorial Park Rd *Jacksonville, FL 32221* *904-359-2497* *Stuart_Sweat@csx.com*

Stuart C. Sweat

Technical Skills/Proficiencies

- 17 years of experience in Railroad Operations Research, Service Design, & Resource Planning Functions.
- 15 years of experience with MultiRail products (MultiRail Enterprise & MultiRail Freight Editions).
- 10 years of budget development for CSX Line of Road Crew Starts.
- 5 years of experience in development and performance of CSX Route Risk Analysis of Hazardous Commodities on the CSX Network.
- 4 years of Capacity Management experience identifying rail choke-points and supporting the Capital Planning process to fund network expansions to support traffic throughput.
- Computer Programming: C, C++, Java, COBOL, SQL, Crystal Reports, FOCUS, Visual Basic, BASICA, & RPG.

Experience

1996-current **CSX Transportation** **Jacksonville, FL**

- **Director Scheduling and Resource Planning** - Modeling the CSX Operating plan with traffic inputs from CSX commercial to reflect network impact and resource Infrastructure, Line of Road Crew forecast, Car Resource Supply and other budgetary items with the use of MultiRail Enterprise Edition. Additional responsibilities include Interline Service Agreements, Interline EDI blocking messages (419/420), Rate Case Defense Team (virtual railroad modeling supporting SARR), Commercial Forecasting SAS development, Network Based Classing (NBC) development & Car Scheduling. Route Risk Analysis of PIH, TIH and Class III explosives and Spent Nuclear fuel. Route Risk Analysis of Bakken Crude Oil.
- **Director Planning** – Line of road crew forecast and capacity management. Implemented "Fully Fund the Plan" by forecasting crew starts based upon the operating plan (TM1 database). This project helped to streamline the forecasting process and ensure that crew planning was factually based upon the expectations of the operating plan.
- **Manager Network Service Scheduling** –Edits to Train Profiles, Class Tracking updates, & Terminal Handling Standards. Performed Curfew Planning functions. Resolved plan failures in the Car Scheduling System. Created Siebel/BOBJ scorecards to establish accountability for cars who fail to get a trip plan when released; dividing that accountability to the Service Planning and Customer Service/Operations teams. Reduced dependency on mainframe FOCUS programming by creating and leading Microsoft Access training to the Service Planning Department using the Plan Integrity data store.
- **Operations Research Analyst** – Provide analytical & programming skills to the Operations Research team supporting Service Planning and Operations Planning groups. (MultiRail, Operations Analyzer, Terminal Rationalization Studies). Managed the creation one of the first Oracle based CSX Operational data stores (Plan Integrity) that has been widely used to ensure the operating plan has data relationship integrity with supporting data sets reference files. Coordinated the CSX/UP Gateway analysis to increase car velocity through the east/west gateways.

1994-1996 **Jacksonville Marine Institute** **Jacksonville, FL**

1986-1994 **US Naval Submarine Service** **Charleston, SC/Kings Bay, GA**

Education

University of North Florida ***Jacksonville, FL*** ***B.S. Information Science***

- *Computer Programming and Database Design, Graph Theory*

Florida Community College ***Jacksonville, FL*** ***A.A. Pre-engineering***

- *Math, Computer Programming, & General studies.*

DAVID R. WHEELER

Mr. Wheeler is the founder of Rail Network Analytics, with offices located at 9222 Nottingham Way, Mason, Ohio 45040. Mr. Wheeler has extensive experience developing railroad operation simulations, including the use of the Rail Traffic Controller ("RTC") program. Mr. Wheeler is sponsoring portions of Section III-B and Section III-C of CSXT's Reply Evidence relating to the RTC Simulation. Mr. Wheeler has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Throughout his career, Mr. Wheeler has focused on advanced analytical techniques for operational improvements and strategic planning. Prior to founding Rail Network Analysis, Mr. Wheeler was employed at Union Pacific Railroad and held various positions, including General Director of Capacity and Operations Analysis for. Mr. Wheeler has more than fifteen years experience in areas including rail operations analysis, capacity analysis, simulation, stand-alone rate cases litigation, structured problem solving using the Six Sigma methodology, supply chain efficiency and mergers & acquisitions. Mr. Wheeler's simulation experience includes not only railroads, but also other high technology industries including cockpit simulation work on the F-16 and F-22 fighter aircraft.

Mr. Wheeler holds a Bachelor of Science degree in engineering and computer science from Merrimack College as well as a Masters of Business Administration degree in finance and operations management from Miami University. Mr. Wheeler has training in the Six Sigma methodology and holds a Six Sigma Blackbelt certification.

Mr. Wheeler's complete curriculum vitae, with additional project experience, is attached.

VERIFICATION

I, David R. Wheeler, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

David R. Wheeler

Executed on this 10th day of July 2014.

DAVID R. WHEELER

Work products include:

1. Corridor analysis for high density, complex Class 1 rail networks using multiple tools including the Rail Traffic Controller (RTC) model to determine the optimal operating plan.

2. Evaluation of five rail industry critical resources; line, terminal, crews, locomotives and technology

3. Passenger Operations on Freight Railroads

4. Stand-Alone Rate Cases analysis

- CSXT Southeast Corridor simulation, Chicago – Jacksonville, and 5 year capacity growth plan
- Incremental Passenger Service simulation and operating analysis between Las Vegas and Los Angeles
- CSXT Montgomery, AL to Jacksonville simulation as alternate to KCS Meridian speedway
- BNSF Coal Network Analysis; long term coal train capacity development at 5, 10, 15 and 20% volume increase levels - Powder River Basin – Denver – Kansas City – Creston
- Surface Transportation Board Rate Case: FMC v. Union Pacific Railroad
- Surface Transportation Board Rate Case: Wisconsin Power & Light v. Union Pacific Railroad
- Surface Transportation Board Rate Case: Duke Energy v. CSXT Railroad
- Surface Transportation Board Rate Case: Xcel Energy v. BNSF Railroad
- Surface Transportation Board Rate Case: Otter Tail Power v. BNSF Railroad
- Surface Transportation Board Rate Case: Western Fuels v. BNSF Railroad
- Surface Transportation Board Rate Case: Arizona Electric Power v. BNSF Railroad
- Surface Transportation Board Rate Case: Arizona Electric Power v. Union Pacific Railroad
- Surface Transportation Board Rate Case: Arizona Electric Power v. Union Pacific Railroad and BNSF Railroad
- BNSF Alliance Terminal process improvement project
- Discounted Cash Flow and Valuation Analysis: Business model and network model development for the acquisition of the Mexican Railroad concessions
- Union Pacific Railroad - team member - capacity development plan to recover the Houston Gulf Coast infrastructure during the operating crisis of 1998
- Union Pacific Railroad Feather River versus Donner Pass route analysis
- Surface Transportation Board – team member on the Union Pacific / Southern Pacific Mitigation plan including the Reno and Wichita oppositions to the merger
- Surface Transportation Board - Environmental Analysis for the Union Pacific Railroad purchase of the Northeast Kansas & Missouri Railroad (NEKM)

- UP/SP Merger Capacity Plan development and implementation
- Surface Transportation Board for Entergy v. Union Pacific Railroad
- Surface Transportation Board Rate Case for Seminole Energy v. CSXT Railroad
- Surface Transportation Board Rate Case for DuPont v. NS Railroad
- Surface Transportation Board Rate Case for Drummond Coal Sales, Inc v. NS Railroad
- Union Pacific Railroad – Amtrak 7-day service Sunset Limited capacity impact study
- Surface Transportation Board Rate Case for Intermountain Power v. Union Pacific Railroad
- Union Pacific Railroad – San Antonio Commuter Rail Operations simulation study

GEORGE T. ZIMMERMAN

Mr. Zimmerman is a Project Manager/Senior Engineer with STV, a professional firm offering engineering, architectural, planning, environmental, and construction management services with offices located at 3505 Koger Boulevard, Suite 205, Duluth, Georgia 30096. Mr. Zimmerman is a railway engineer and project manager with more than 30 years of experience on roadway and bridge projects and has particular expertise in freight planning, design, and construction management. Mr. Zimmerman is sponsoring portions of Section III-F of CSXT's Reply Evidence relating to Track Construction and the Construction Schedule. Mr. Zimmerman has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

Mr. Zimmerman's resident engineering and inspection experience includes grade crossings and roadway, railway, and highway bridges. Mr. Zimmerman works with railroads on a daily basis, assisting in the preparation of proposals and contracts. In addition, Mr. Zimmerman provides structural design and plan reviews for railway and bridge projects. Mr. Zimmerman holds a Bachelor of Science, Civil Engineering from West Virginia University and is a member of the Roadway and Ballast Committee of the American Railway Engineering and Maintenance of Way Association (AREMA).

Mr. Zimmerman's resume, with additional project experience, is attached hereto.

VERIFICATION

I, George T. Zimmerman, declare under penalty of perjury that I have read the portions of the Reply Evidence of CSX Transportation, Inc. that I have sponsored (as described in the foregoing Statement of Qualifications), that I know the contents thereof, and that the evidence I have sponsored is true and correct. Further, I certify that I am qualified and authorized to file this statement.

George T. Zimmerman

Executed on this 16 day of July 2014.

George T. Zimmerman, P.E.

Project Manager/Senior Engineer

Mr. Zimmerman is a railway engineer and project manager with more than 30 years of experience on roadway and bridge projects and particular expertise in freight planning, design, and construction management. His resident engineering and inspection experience includes grade crossings and roadway, railway, and highway bridges. Mr. Zimmerman manages STV's relationship with Norfolk Southern, working with the railroad on a regular basis and assisting in the preparation of proposals and contracts. In addition, he provides structural designs and plan reviews for railway and bridge projects.

Office Location
Duluth, GA

Date joined firm
5/16/79

Years with other firms
0

Education
Bachelor of Science, Civil Engineering; West Virginia University (1979)

Professional Registrations
Professional Engineer: Georgia (1992/#019811/exp. 12/31/14), Kansas (2002/ #17069/exp. 4/30/13), Missouri (2003/ #2003000042/exp. 12/31/13), Ohio (2001/#65833/exp. 12/31/13), South Carolina (1989/#12625/exp. 6/30/14)

Memberships
Roadway and Ballast Committee Member, American Railway Engineering and Maintenance of Way Association (AREMA)

American Society of Civil Engineers (ASCE)

Project Experience

BRIDGES

Norfolk Southern Jeffersonville Road Widening - Project Manager
Managed the preliminary layout and design of a 4-span, 93.5-meter-long steel deck plate girder railroad bridge in Macon, GA. The single-track bridge will carry Norfolk Southern over Jeffersonville Road, which was widened from two to five lanes. The project included track realignment to allow off-line construction. (2002 - 2007)

GDOT Railroad Bridges over Butler Street and Piedmont Avenue - Senior Engineer
Provided bridge design for the widening of two CSX Railroad bridges over Butler Street and Piedmont Avenue in Fulton County, GA, and two retaining walls for the Georgia Department of Transportation (GDOT). (2002 - 2006)

GDOT S.R. 3 Connector - Senior Engineer
Designed a replacement bridge and adjoining roadway over I-75 on the S.R. 3 connector in Whitfield County, GA. The 8-lane bridge replaced a 2-lane structure of insufficient capacity. Work included horizontal and vertical design, construction plans, right-of-way plans, and construction staging plans, as well as pavement marking and signing plans. All design work for this Georgia Department of Transportation (GDOT) project was done in metric. (1995)

CSX Railroad over Monroe Road - Resident Engineer
Provided construction management and coordination with the railroad for this through-girder, single-track railroad structure in Charlotte, NC. The project included a temporary detour trestle, track realignment, staged construction, and coordination with the highway portion of the project. The underpass is located in what was one of the emerging growth corridors of the Charlotte area. (6/87 - 12/88)

COMMERCIAL

Private Developer Silas Creek Crossing Shopping Center - Resident Inspector
Provided construction observation for a 200,000-sf retail shopping center, highway bridge, and concrete box culvert in Winston Salem, NC. (7/88 - 3/89)

HIGHWAYS/ROADWAYS

Piper Glen Development Corporation Rea Road Extension - Engineer
Provided construction coordination and management for 1.65-mile roadway extension to serve as the main thoroughfare for Piper Glen Development in Mecklenburg County, NC. The $2.5 million roadway and highway bridge project were built to be taken into the North Carolina Department of Transportation system and connected to the Charlotte Outer Beltway. (6/87 - 6/89)

INDUSTRIAL

IBM Research and Manufacturing Facility University Research Park - Engineer
Provided staging and design, earthwork, and site plan staging for balancing of cuts and fills for recreational facilities during construction of the building site and railway in Charlotte, NC. (5/79 - 11/79)

RAIL: COMMUTER RAIL

Central Midlands Council of Governments Camden to Columbia Corridor Alternatives Analysis – Senior Rail Engineer
Contributed to the alternatives analysis for potential mass transit technologies and corridors between Camden, SC, and Columbia, SC. Mr. Zimmerman assisted the planning team by providing rail information, traffic potential, and operational layouts in Columbia where rail lines intersect. He also identified areas of structural conflict requiring further study and analysis. (6/09 - 6/11)

FTA PMO Denver RTD/CDOT Capital Program - Senior Engineer
Identified locations along proposed alignments where changes would be made to the Burlington Northern Santa Fe and Union Pacific Railroad tracks as part of project management oversight (PMO) services to the Federal Transit Administration (FTA) for the Denver Regional Transportation District (RTD)/Colorado Department of Transportation (CDOT) commuter rail system in Denver. Mr. Zimmerman also determined if the work could be considered a required railroad change or betterment for the railroad involved. To determine this, the trackwork and civil improvements to the rail system and track roadbed were evaluated as individual projects, but with a larger area view if there were track changes or replacements involved. (8/10 - 1/11)

CSX Ronald Reagan Parkway - Project Manager/Resident Engineer
Managed the construction engineering inspection of the CSX Railroad bridge over Ronald Reagan Parkway near Lawrenceville in Gwinnett County, GA. (2/92 - 12/93)

Norfolk Southern I-64 over Norfolk Southern - Resident Engineer
Observed construction field activities and represented the Norfolk Southern Railroad for two bridges over the railway, one at milepost 4.43 VB, and one at milepost 5.04 NS in Norfolk, VA. (1/90 - 2/92)

City of Virginia Beach Pungo Ferry Bridge - Resident Engineer
Provided construction management and inspection services and represented the City of Virginia Beach for the construction of the replacement of this obsolete swing span with a 3,400-foot-long highway bridge over the Intracoastal Waterway in Virginia Beach, VA. The project included roadway approaches and the placement of a geosynthetic stabilized embankment over adjacent wetlands. (1989 - 1992)

Norfolk Southern over Harris Boulevard - Resident Engineer
Provided construction management for a double-track Norfolk Southern underpass built using a temporary detour alignment in Newell, NC. (7/88 - 6/89)

City of Charlotte Tyvola Road Extension - Resident Structural Inspector
Inspected this 3.6-mile, 5-lane roadway extension in Charlotte, NC, including a new interchange with a 7-lane bridge over Billy Graham Parkway, eight reinforced concrete box culverts, and a 6-lane bridge over Sugar Creek. (6/87 - 6/89)

RAIL: FREIGHT RAIL

Sandersville Railroad Alternate Route Study - Senior Engineer
Providing location, evaluation, and cost estimates for a 12-mile industrial lead in Washington County, GA (10/11 - Present)

Cambridge Systematics CSXT Intermodal Location Feasibility Assistance - Lead Railroad Engineer
Collaborating with the Maryland Department of Transportation (MDOT) in the review and evaluation of preliminary plans for alternate sites for CSXT intermodal transfer facilities in the Baltimore, MD, area. Mr. Zimmerman is assisting MDOT in interpreting CSXT plans and figures, explaining CSXT requirements, and verifiying that provided information is consistent with current CSXT and railroad industry standards of practice. (8/11 - Present)

R. J. Corman Railroad On-Call Services Contract - Project Manager
Managing plan review and construction engineering and inspection services on an on-call, as-needed basis for proposed roadway, bridge, and miscellaneous projects affecting railway facilities throughout various R. J. Corman Railroad lines in the eastern United States. Mr. Zimmerman has overseen construction of overhead bridges, underpasses, utility crossings,

parallel construction of utilities, roadways, and grade crossings since 2007. (2007 - Present)

Norfolk Southern On-Call Services Contract - Project Manager
Managing plan review and construction engineering and inspection services on an on-call, as-needed basis for more than 1000 proposed roadway, bridge, and retaining wall construction projects affecting railway facilities throughout the 22-state Norfolk Southern system. Mr. Zimmerman has overseen construction of overhead bridges, underpasses, floodwalls, and utility crossings, and parallel construction of utilities, roadways, bikeways, and grade crossings since 1992. (1992 - Present)

Norfolk Southern Heartland Corridor Clearance Improvements CM - Project Manager
Coordinated various teams providing construction management (CM) services for portions of the Heartland Corridor Clearance Project, an award-winning, $191 million initiative to improve 28 tunnels and seven through-truss bridges and remove 24 overhead obstacles to provide a direct double-stacked container train route from the ports of Virginia through West Virginia and eastern Kentucky into central Ohio. Mr. Zimmerman oversaw the raising of a bridge at Harding Street in Bluefield, WV; stormwater and erosion control plans at various tunnel sites; and numerous bridge lowering and slide fence clearance tasks. (1/07 - 8/10)

LAMTPO Rail Relocation and Intermodal Facility Feasibility Study - Senior Engineer
Provided design engineering services for the proposed relocation of the Norfolk Southern Railroad mainline through Morristown, White Pine, and Jefferson City, TN, as part of a study for the Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO) to determine the feasibility of relocating the Norfolk Southern A Line and installing an intermodal facility in Morristown. Mr. Zimmerman assisted in gathering information and determining railroad design and operation requirements. The A Line, which runs through downtown Morristown, will be eliminated and either a new line will be built or an existing line will be improved in the county. The intermodal facility will facilitate connections between freight lines along Interstate 81 and the Norfolk Southern Crescent. (3/08 - 4/09)

Rochester & Southern Railroad Silver Springs Connection Track - Project Manager
Reviewed rail design for a Rochester & Southern Railroad connection track in Silver Springs, NY. The connecting track will allow unit coal train movement from Norfolk Southern Railroad to the Rochester & Southern Railroad. Mr. Zimmerman's responsibilities included coordination with Norfolk Southern. (2007 - 2009)

Vulcan Materials Company Skippers Quarry Loop Track - Project Manager
Provided project administration and coordinated staff in multiple offices for the preliminary and final design of a 0.75-mile loop track, including a 100-

foot-long open deck railroad trestle, for Vulcan Materials Company at Skippers Quarry in Skippers, VA. The track is used for loading unit rail trains with railroad ballast and other crushed aggregate materials. (1/07 - 1/09)

STB Railroad Coal Rate Case Litigation Cost Assessments - Project Manager

Determined values for track work items and construction staging of the work plan for this Surface Transportation Board (STB) project, which included assembling the planning, engineering, and construction costs to build a hypothetical contemporary operating railroad in North Carolina, as part of a cost assessment for a several coal rate cases. Cost assessments included major earthwork, bridge and culvert construction, track, communications and signalization, engineering design, construction management, material costs and logistics, mobilization, and contingencies. Cases included Norfolk Southern versus Duke Energy, Norfolk Southern versus Carolina Power & Light, CSX versus Duke Energy, Burlington Northern Santa Fe (BNSF) and Union Pacific versus AEC, BNSF versus Otter Tail, and AEP Texas North versus BNSF. (2000)

Norfolk Southern Automobile Mixing Facility - Project Manager

Provided preliminary and final hydraulic/hydrologic, railway, roadway, highway, and railway bridge design for this Ford automobile mixing facility in Shelbyville, KY. The project included 2.5 million cubic yards of earthwork, 18 miles of track installation, a 45-acre paved vehicle storage yard, 3 bridges, and 2 access roads. (8/96 - 12/97)

CSX Double-Track Program - Project Manager

Designed 7 miles of track parallel to the CSX Railroad main line in Marietta, GA. The project included a study of several grade-crossing eliminations and retaining wall structures. (1995)

Norfolk Southern Third Mainline Track - Project Manager

Managed engineering services for the design and construction of a 2.9-mile third main track from adjacent to CSX's Queensgate Yard to Mitchell Avenue in Cincinnati. Mr. Zimmerman provided project management as well as the design of all earthwork, track work, and retaining structures. (6/94 - 7/95)

USACE Omaha District Wharf Track Military Ocean Terminal - Senior Engineer

Provided engineering services for track material research for the rehabilitation of 3.5 miles of railroad track on concrete wharfs in Sunny Point, NC, for the U.S. Army Corps of Engineers (USACE). (1994)

CSX Railroad Relocation, Consolidation, and Grade Crossing Elimination - Contract A Resident Engineer, Contract B Assistant Resident Engineer

Supervised the $16.7 million construction of a railway roadbed, including 7,600 linear feet of grading, in Columbia, SC. The project included drainage, dewatering, utilities, and retaining walls. (4/83 - 4/87)

Graham County Development Corporation Graham County Railroad - Resident Engineer
Provided construction management and testing services for the $1.65 million rehabilitation of 12.65 miles of track and 13 small railroad bridges, including drainage improvements and 1.25 miles of track relayed with heavier rails on a steep mountainous grade, for this railroad between the re-established connection to the Southern Railway at Totpon, NC, to the Bemis Lumber Company yard in Robbinsville, NC. (1/81 - 4/83)

RAIL: LIGHT RAIL

CATS LYNX Blue Line Extension Light Rail Project - Senior Engineer
Responsible for the coordination and resolution of issues generated by the preliminary design in areas along the corridor that involve Norfolk Southern, North Carolina and the Aberdeen, Carolina, and Western Railroads as part of the a new 9.3-mile light rail transit line extension in Charlotte, NC. Mr. Zimmerman is working with the Charlotte Area Transit System (CATS) to successfully integrate transit and land use, and to solve challenges associated with crossing and running along existing freight railroad right-of-way. The plans must satisfy the requirements of four different railroads so the city can secure necessary agreements. (2008 - Present)

SITE DEVELOPMENT

Statesville Redevelopment Authority Newtonville Subdivision - Resident Engineer
Provided construction management, inspection, and field testing services for the redevelopment of the $500,000 Newtonville Subdivision for the City of Statesville, NC. This project included the total removal of all existing facilities and the construction of all new infrastructure including excavation, drainage, utility installation, and street construction. (11/79 - 7/80)