Appendix C

IMPROVEMENT COST EVALUATION

MARCH 2015

IMPROVEMENT COST EVALUATION

As described below, some cost elements have high degrees of uncertainty such as trackage rights on freight rail lines, operations and maintenance costs, contingencies and Positive Train Control implementation (as well as ridership and revenue as discussed elsewhere). For these cost elements, high (referred to as base) and low (referred to as best) cost estimates were developed. Data for individual rail segments and corridors is shown only for the base case. All summary tables show both sets of estimates.

PASSENGER RAIL COST ESTIMATES

Improvement cost estimates were developed using the assumptions and unit costs listed in Table C.1. Costs are provided for items such as track and signal upgrades, rolling stock, and operating and maintenance costs, and are based on a variety of sources, including recent Northstar[1] and Amtrak information.[2,3,4] Estimates do not include costs that may be associated with stations or costs for any major structural modifications to railroad overpasses or underpasses.

Another unknown is the cost of right of way for greenfield line segments. It has been suggested that greenfields in rural areas could be acquired inexpensively. It is likely that all landowners will fight hard for maximum compensation, even to the point of court actions, which regardless of the outcome will significantly increase the time and cost of acquisitions. It is likely that any rail alignments will split individually-owned land parcels requiring premium payments. Therefore, a relatively high estimate of this cost has been carried through both scenarios.

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1 Based on recent internal Northstar team communications

2 Consolidated Financial Statements. National Railroad Passenger Corporation and Subsidiaries (Amtrak). For the Years Ended September 30, 2007 and 2006.

3 System Mileage within the United States. Bureau of Transportation Statistics. www.bts.gov/publications/national_transportation_statistics/html/table_01_01.html. Retrieved 9/22/2009.

4 U.S. Vehicle Miles. Bureau of Transportation Statistics. www.bts.gov/publications/national_transportation_statistics/html/table_01_32.html. Retrieved 9/22/2009.

Table C.1: Cost Assumptions for Passenger Rail

COST ITEM	COST	UNIT	SOURCE
ROLLING STOCK			
High-Speed Rail	$23.5 million	Trainset	Talgo/Wisconsin
Conventional Rail	$18 million	Trainset	Northstar
UPGRADE TRACK			
Class I to II	$63,360	Mile	TKDA
Class II to IV	$712,800	Mile	TKDA
Class III to IV	$712,800	Mile	TKDA
Class IV to VI	$79,200	Mile	TKDA
New Class IV/VI	$2,600,000	Mile	TKDA
SIGNALIZATION			
CTC (Single Track)	$550,000	Mile	Northstar
CTC (Double Track	$750,000	Mile	Northstar
PTC	$100,000	Mile	Estimated implementation cost of the Rail Safety Improvement Act (RSIA) of 2008 divided by Class I system mileage from the Bureau of Transportation Statistics (BTS)
PTC Loco	$30,000	Locomotive	Northstar
CROSSINGS			
Grade Crossing Upgrade	$200,000	Mile	TKDA
Quad Crossing	$400,000	Mile	TKDA
OPERATIONS AND MAINTENANCE (O & M)			
HSR O&M – Base/Best Case	$70	Annual Train Miles	Amtrak fully allocated expenses divided by train mileage from BTS/Amtrak direct costs divided by train mileage from BTS
Conventional O&M – Base/Best Case	$70	Annual Train Miles	Amtrak fully allocated expenses divided by train mileage from BTS/Amtrak direct costs divided by train mileage from BTS
RIGHT OF WAY			
Right of Way	$910,000	Mile	$50,000/Acre and 150-foot right of way assumed
CAPACITY RIGHTS			
Capacity Rights – Base/Best Case	$85,000	Daily Train Miles	Northstar/Reduction from Northstar amount to account for congestion on Staples Subdivision
ADDITIONAL COSTS (APPLIED TO TRACK AND SIGNAL)			
Engineering	10%		
Contingency	30%		

FREIGHT RAIL COST ESTIMATES

Improvement cost estimates were developed using the assumptions and unit costs listed in Table C.2. While use of unit costs for calculating improvements is the simplest approach, in several cases combinations of improvements were required and lump sum costs are displayed for various projects. Costs are provided for items such as track and signal upgrades, clearance restrictions, 286,000-pound railcar compliancy and other categories of improvements. Cost estimates do not include cost for right-of-way.

Table C.2: Cost Assumptions for Freight Rail Corridors

COST ITEM	COST	UNIT
UPGRADE TRACK		
Class I to II	$63,360	Mile
Class II to IV	$712,800	Mile
Class III to IV	$712,800	Mile
New Class IV	$1.7 million	Mile
Class I to II	$63,360	Mile
SIGNALIZATION		
CTC (Single Track)	$550,000	Mile
CTC (Double Track	$750,000	Mile
SIGNALIZATION (CONTINUED)		
PTC	$100,000	Mile
CROSSINGS		
Active Warning Device	$200,000	Signal
ADDITIONAL COSTS (APPLIED TO TRACK AND SIGNAL)		
Engineering	10%	
Contingencies Base	30%	

Information provided from the 2010 State Rail Plan

Table C.3: Twin Cities Core Projects – Freight, Passenger, and Crossing Safety

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE
FREIGHT PROJECTS				
BNSF	Hinckley Subdivision	Coon Creek Junction/Third Main	$100.0	TBD
BNSF	Midway Subdivision	Add track and passing sidings	$ 5.3	TBD
BNSF	Saint Paul Subdivision	Adding 0.26 miles of additional track to the existing double main track between Seventh Street and Hoffman Junction	$ 0.4	TBD
BNSF	Minneapolis Junction	Improvements to the west leg of the wye to increase track speed on the curve and facilitate NLX routing	$33.0	TBD
BNSF	Saint Anthony Junction	Improvements in and around Minnesota Commercial's A Yard to facilitate higher speeds and volumes on the Saint Paul Subdivision	$ 27.0	TBD
BNSF	St. Croix Junction to Prescott, WI	Rehab/Replace Double Track Lift Bridge over St. Croix River	$50	TBD
BNSF	East Metro	New Siding	TBD	TBD
BNSF/CP	East Metro	Third Main/Yard leads, Cottage Grove	$65.6	TBD
BNSF/CP	East Metro	Third Main/mainline & connectors, Hoffman-Newport	$61.9	TBD
BNSF/CP	East Metro	St. Croix Flyover and connectors	$429.6	TBD
BNSF/CP	East Metro	Mississippi River Bridge/Hastings	$ 853.4	TBD
BNSF/CP	East Metro	Access Road	TBD	TBD
BNSF/CP/UP	East Metro	Hoffman-Westminster Trench/UP underpass	$84.1	TBD
BNSF/CP/UP	East Metro	Hoffman Junction & Wye/Flyover	$122.0	TBD
CP	Merriam Park Subdivision	Prior Ave Bridge	$3.0	TBD
CP	Merriam Park Subdivision	Snelling Ave Bridge	$10.0	TBD
CP	Merriam Park Subdivision	Prior Ave Junction Easement/Merriam Park Junction	$20.0	TBD
CP	Saint Paul	CP Saint Paul Yard capacity expansion	$60.0	CP
CP	Hastings bridge	Proposed replacement bridge would be a 324-foot-long double track vertical lift span	$90.0	TBD
TBD	TBD	Intermodal Facility – New Twin Cities Area Facility	$150.0	TBD
TCW	Savage	Rehabilitate currently out-of-service bridge over Minnesota River. A proposed replacement bridge would be a single track 160-foot-long through truss vertical lift span.	$34.0	TBD

UP	Albert Lea Subdivision	Dan Patch Interchange	$10.0	TBD
UP	Albert Lea Subdivision	Pigs Eye Bridge (UP) over Mississippi River. A proposed replacement bridge would be a 240-foot-long single track vertical lift span.	$ 76.0	TBD
UP	Hudson	Improve/replace bridge over St. Croix River. A proposed replacement bridge would be a 160-foot-long single track vertical lift span.	$87.0	TBD
UP	Mankato Subdivision - Shakopee	Realign main line to increase speed in and around Shakopee	$163.0	TBD
UP	Mendota Heights	Mendota Heights (UP) (Omaha Road Bridge Number 15) over Mississippi River. A proposed replacement bridge would be a 200-foot-long single track vertical lift span.	$44.0	TBD
UP	Saint Paul	Robert Street Vertical Lift Bridge (UP) over Mississippi River	$51.0	TBD
PASSENGER PROJECTS				
BNSF	Midway Subdivision	Add track and upgrade to FRA Class 4	$17.4	TBD
BNSF	Twin Cities Core	Capacity rights on Saint Paul and Midway Subdivisions for Minneapolis to Saint Paul Passenger Service	$9.5	TBD
BNSF	University Interlocking	Improvements to avoid congestion on the BNSF line and allow the CP to exit the BNSF Hinckley Subdivision at higher speeds	$14.0	TBD
BNSF	East Metro	Passenger Mainline along BNSF St. Paul Subdivision	TBD	TBD
CP	East Metro	Newport Station (Red Rock Corridor)	TBD	TBD
CP	East Metro	Lower Afton Station (Red Rock Corridor)	TBD	TBD
CP	East Metro	Cottage Grove Station (Red Rock Corridor)	TBD	TBD
CP	East Metro	Hastings Station (Red Rock Corridor)	TBD	TBD
CROSSING SAFETY PROJECTS				
BNSF	Como Avenue, Saint Paul	Grade Separation	$25.0	TBD
CP	Winnetka Avenue, New Hope	Active Warning Devices Upgrades-4 Quad Gates, Paynesville Subdivision	$0.6	TBD
CP	Lyndale Ave N, Minneapolis	Active Warning Devices Upgrades-4 Quad Gates, Paynesville Subdivision	$0.6	TBD

Table C.4: Twin Cities to Des Moines, Iowa (I-35 Corridor)

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE
FREIGHT PROJECTS				
UP	Albert Lea Subdivision	Install CTC between St Paul Yard across St Paul UP Bridge	$1.6	TBD
PASSENGER PROJECTS				
UP	Multiple	Add/upgrade 39.2 miles of signaling for Twin Cities to Albert Lea Corridor	$30.2	TBD
UP	Multiple	Capacity Rights for Twin Cities to Albert Lea Corridor	$76.8	TBD

Table C.5: Twin Cities to Chicago (River Route)

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE
FREIGHT PROJECTS				
CP	La Crescent	Replace span with single, fixed, double track bridge on CP's Tomah Subdivision	$117.0	TBD
PASSENGER PROJECTS				
CP	Twin Cities - Chicago	Grade Crossing Improvements	$50.8	TBD
CP	Twin Cities - Chicago	Upgrade 127 miles of signals	$92.4	TBD
CP	Twin Cities - Chicago	Capacity Rights for Twin Cities to Chicago (River Route) Corridor	$172.7	TBD
CP	Twin Cities - Chicago	Add 228.64 miles of track	$752.2	TBD
CROSSING SAFETY PROJECTS				
CP	Sturgeon Lake Road (at Prairie Island), Red Wing	Grade Separation	$14.2	TBD
CP	W Lyon Avenue (US-63), Lake City	Active Warning Devices Upgrades-4 Quad Gates	$0.6	TBD
CP	Louisa Street, Winona	Grade Separation	$12.0	TBD
CP	Sioux Street, Winona	Active Warning Devices Upgrades-4 Quad Gates	$0.6	TBD

Table C.6: Twin Cities to Duluth

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE
PASSENGER PROJECTS				
BNSF	Staples Subdivision	5.4 miles new track on Staples Subdivision between Twin Cities and Cambridge	$19.4	TBD
BNSF	Minneapolis to Duluth	NLX Tier II EIS	TBD	ARRA
BNSF	NLX	BNSF bridge 91.8, replace single-track bridge on Hinckley Subdivision	$2.0	TBD
BNSF	NLX	BNSF bridge 28.3, replace single-track bridge on Hinckley Subdivision	$4.0	TBD
BNSF	NLX	BNSF bridge 30.2, replace single-track bridge on Hinckley Subdivision	$6.0	TBD
BNSF	NLX	Capacity Rights from Minneapolis to Cambridge on NLX Corridor	$7.4	TBD
BNSF	NLX	BNSF bridge 62.4, replace single-track bridge on Hinckley Subdivision	$13.0	TBD
BNSF	NLX	Grassy Point swing bridge (BNSF) over Saint Louis river	$51.0	TBD
BNSF	NLX	Add 181.9 miles of signals	$198.4	TBD
BNSF	NLX	Add 127.81 miles new track	$447.2	TBD
CROSSING SAFETY PROJECTS				
BNSF	Multiple	Grade crossing improvements on Twin Cities to Cambridge Corridor	$1.2	TBD
BNSF	NLX	Grade Crossing improvements on NLX Corridor	$60.8	TBD

Table C.7: Twin Cities to Eau Claire, WI

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE
PASSENGER PROJECTS				
BNSF	Saint Paul Subdivision	Add 0.24 miles of track for Twin Cities to Eau Claire Corridor	$0.9	TBD
UP	Altoona Subdivision	Capacity rights in Wisconsin for Twin Cities to Eau Claire Corridor	$46.9	TBD
UP	Saint Paul Subdivision	Capacity rights in Minnesota for Twin Cities to Eau Claire Corridor	$12.2	TBD
UP	Altoona Subdivision	Add/upgrade 86 miles of signals for Twin Cities to Eau Claire Corridor	$87.1	TBD

Table C.8: Twin Cities to Fargo/Moorhead

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE
FREIGHT PROJECTS				
BNSF	Capital costs	Add 82.69 miles of new signals	$62.6	TBD
BNSF	KO Subdivision	Add passing sidings (1.16 miles) on the KO Subdivision for Twin Cities to Fargo/Moorhead Corridor	$2.0	TBD
BNSF	KO Subdivision	Additional passing sidings and new track beyond existing double main track on KO Subdivision	$2.9	TBD
BNSF	Moorhead Junction	Improvements to turnouts to increase track speed on the KO subdivision	$5.0	TBD
PASSENGER PROJECTS				
BNSF	Prosper Subdivision	0.53 miles, upgrade ABS to CTC signals	$0.6	TBD
CROSSING SAFETY PROJECTS				
BNSF	Broadway W (MN-27), Little Falls	Active Warning Devices Upgrades-4 Quad Gates	$0.6	TBD
BNSF	Farwell Street, Verndale	Active Warning Devices Upgrades-Medians	$0.1	TBD
BNSF	SW Brown Street, Verndale	Active Warning Devices Upgrades-Medians	$0.1	TBD
BNSF	Jefferson Street S (US-71), Wadena	Active Warning Devices Upgrades-Interconnect with Adjacent Roadway Traffic Signals	$0.3	TBD
BNSF	S Main Avenue, New York Mills	Active Warning Devices Upgrades-4 Quad Gates	$0.6	TBD
BNSF	1st Avenue N, Perham	Active Warning Devices Upgrades-4 Quad Gates	$0.6	TBD
BNSF	6th Avenue NW, Perham	Grade Separation	$10.0	TBD
BNSF	5th Street W, Frazee	Active Warning Devices Upgrades-Medians	$0.1	TBD
BNSF	Parke Avenue S, Glyndon	Active Warning Devices Upgrades-Medians	$0.1	TBD
BNSF	11th Street S, Moorhead	Grade Separation, KO and Moorhead Subdivisions	$55.0	TBD

Table C.9:.Twin Cities to Mankato

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE
PASSENGER PROJECTS				
UP	Mankato Subdivision	Capacity Rights for the Twin Cities to Mankato Passenger Corridor	$57.1	TBD
UP	Mankato Subdivision	82.6 miles, convert NS, ABS, and TWC to CTC	$63.6	TBD
UP	Mankato Subdivision	Upgrade 84 miles to FRA 4	$84.0	TBD

Table C.10: Twin Cities to Saint Cloud

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE
FREIGHT PROJECTS				
BNSF	Staples Subdivision	Double track, Randall to Lincoln	$20.0	BNSF
BNSF	Hinckley Subdivision	Passing sidings (23.54 miles)	$10.0	TBD
BNSF	Midway Subdivision	Add passing sidings (0.624 miles) for Twin Cities to Saint Cloud Corridor	$1.1	TBD
BNSF	Staples Subdivision	Sidings and Track (4.2 miles)	$7.3	TBD
BNSF	Staples Subdivision	24 miles new track	$86.6	TBD
BNSF	Staples Subdivision	Big Lake to Becker, and Little Falls to Darling second main track	TBD	BNSF
PASSENGER PROJECTS				
BNSF	Staples Subdivision	Upgrade 14 miles of track from FRA 3 to FRA 4	$28.0	TBD
BNSF	Staples Subdivision	Capacity Rights – Minneapolis to St. Cloud	$91.1	TBD
CROSSING SAFETY PROJECTS				
BNSF	Staples Subdivision	Grade Crossing Improvements	$3.5	TBD
BNSF	Foley Blvd NW (CSAH-11), Coon Rapids	Grade Separation	$30.0	TBD
BNSF	Hanson Blvd NW (CSAH 78), Coon Rapids	Grade Separation	$23.2	TBD
BNSF	Ferry Street (MN-47), Anoka	Grade Separation	$20.0	TBD
BNSF	Sunfish Lake Road NW (CSAH 57), Ramsey	Grade Separation	$10.0	TBD
BNSF	Ramsey Blvd NW (CSAH 56), Ramsey	Grade Separation	$11.5	TBD
BNSF	Main St NW, Elk River	Grade Separation	$25.0	TBD
BNSF	Proctor Avenue NW, Elk River	Grade Separation	$20.0	TBD

Table C.11: Twin Cities to Sioux Falls, South Dakota (via Willmar)

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE
FREIGHT PROJECTS				
BNSF	Marshall Subdivision	Installation of CTC on 122.6 miles from Willmar to South Dakota border	$67.4	TBD
PASSENGER PROJECTS				
BNSF	Marshall Subdivision	Upgrade 91 miles of track from FRA 3 to FRA 4	$161.2	TBD
BNSF	Marshall Subdivision	Capacity Rights – Minneapolis to State Line	TBD	TBD
BNSF	Prosper Subdivision	Capacity rights on the Prosper Subdivision on the Twin Cities to Fargo/Moorhead Corridor	$41.1	TBD
CROSSING SAFETY PROJECTS				
BNSF	Prosper Subdivision	Grade Crossing Improvements	$3.6	TBD
BNSF	East Main Street, Pipestone	Active Warning Devices Upgrades-4 Quad Gates, Medians, Marshall Subdivision	$0.6	TBD

Table C.12: Additional Freight and Crossing Safety Improvements

RAILROAD	LOCATION	PROJECT DESCRIPTION	COST ($ MILLIONS)	FUNDING SOURCE	CORRIDOR
FREIGHT PROJECTS					
BNSF	Willmar	Willmar Wye Bypass	$20.0	BNSF	Moorhead to Sioux Falls
CN	Duluth	Steelton Hill (Duluth) Double Track	$40.0	CN	Duluth
CN	Ranier	Ranier Yard Expansion	$15.0	CN	Ranier
CN	Rainy/Superior Subdivisions	Signal upgrades from Ranier to Duluth	$10.0	CN	Ranier to Duluth
MVRRA	Minnesota Prairie Line	Track upgrades from Class 1 to Class 2, 60 miles	$58.0	TBD	Hanley Falls to Norwood
CROSSING SAFETY PROJECTS					
BNSF	Main Avenue, 20th Street, 21st Street, Moorhead	Grade Separation, Moorhead Subdivision	$43.0	Partially funded	Moorhead to Willmar
BNSF	30th Ave S, Moorhead	Grade Separation, Moorhead Subdivision	$15.0	TBD	Moorhead to Willmar
BNSF	W 7th Street, Morris	Active Warning Devices Upgrades-4 Quad Gates, Morris Subdivision	$0.6	TBD	Moorhead to Willmar
BNSF	W 5th Street, Morris	Active Warning Devices Upgrades-4 Quad Gates, Morris Subdivision	$0.6	TBD	Moorhead to Willmar

BNSF	County Road 22 (CSAH 22), Morris	Active Warning Devices Upgrades-Medians, Morris Subdivision	$0.1	TBD	Moorhead to Willmar
BNSF	14th Street S (MN-29), Benson	Grade Separation, Morris Subdivision	$10.0	TBD	Moorhead to Willmar
BNSF	US-12 & MN-40, Willmar	Grade Separation, (result of Willmar Wye Bypass construction)	$49.8	Multiple, Partially funded	Moorhead to Willmar, Willmar to Sioux Falls
CP	Oak Avenue, Maple Lake	Active Warning Devices Upgrades-Medians, Paynesville Subdivision	$0.1	TBD	Twin Cities to Bismarck
CP	S Myrtle Drive, Annandale	Crossing Closure	$0.3	TBD	Twin Cities to Bismarck
CP	Main Street, Kimball	Active Warning Devices Upgrades-Medians, Paynesville Subdivision	$0.1	TBD	Twin Cities to Bismarck
CP	Central Avenue, Watkins	Active Warning Devices Upgrades-4 Quad Gates , Paynesville Subdivision	$0.6	TBD	Twin Cities to Bismarck
CP	MN-29, Glenwood	Grade Separation, Elbow Lake Subdivision	$10.0	TBD	Twin Cities to Bismarck