Amtrak Northeast Regional
Proposed Bedford, VA Station

RTC Analysis

Final Report

September 2021

Strategic Planning
Industrial Engineering

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NORFOLK SOUTHERN

01 Project Overview
New Amtrak station @ Bedford

- VPRA and Norfolk Southern have agreed to evaluate, for informational purposes only, collateral track and signal improvements that would enable the addition of an Amtrak station stop at Bedford, Virginia to its existing and proposed future 2nd roundtrip service between Washington, D.C. and Roanoke, VA.

- This evaluation does not constitute an offer or an agreement to permit the construction or institute new service.

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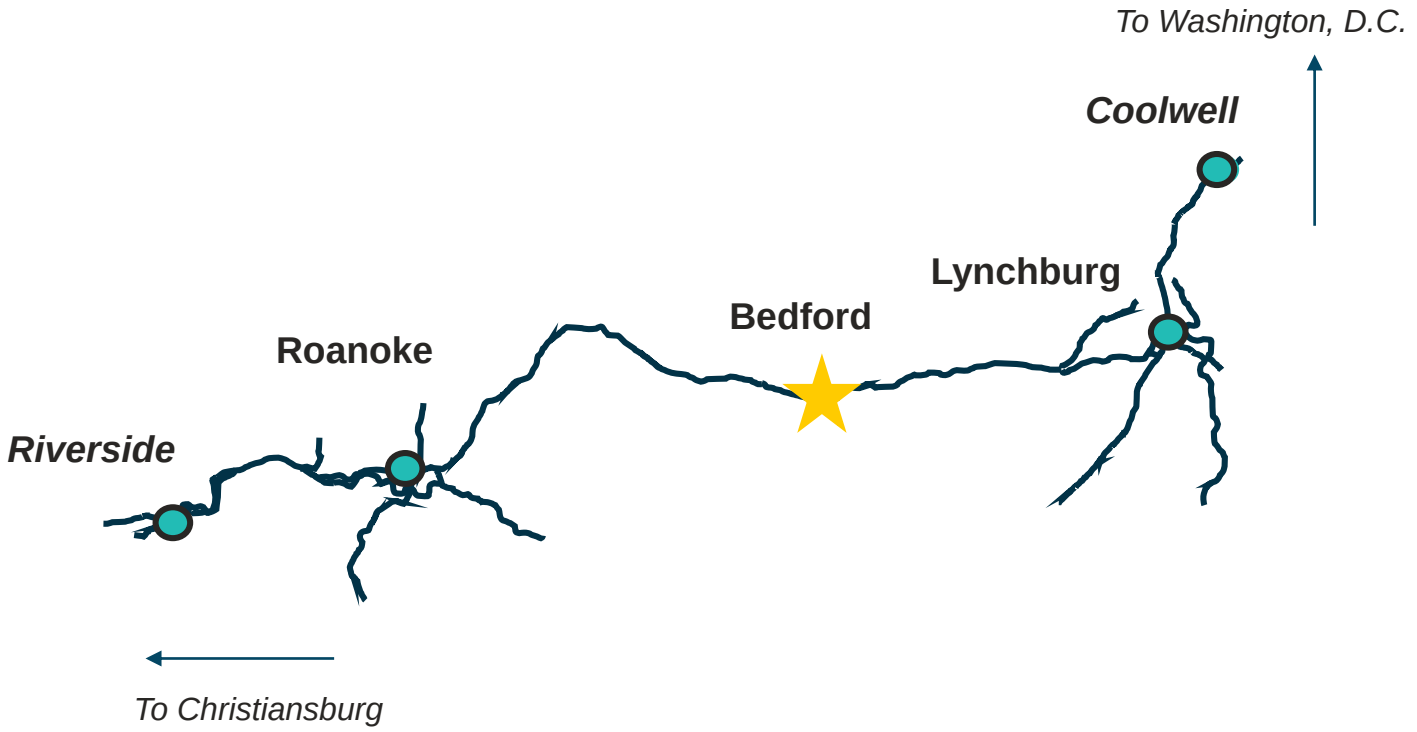
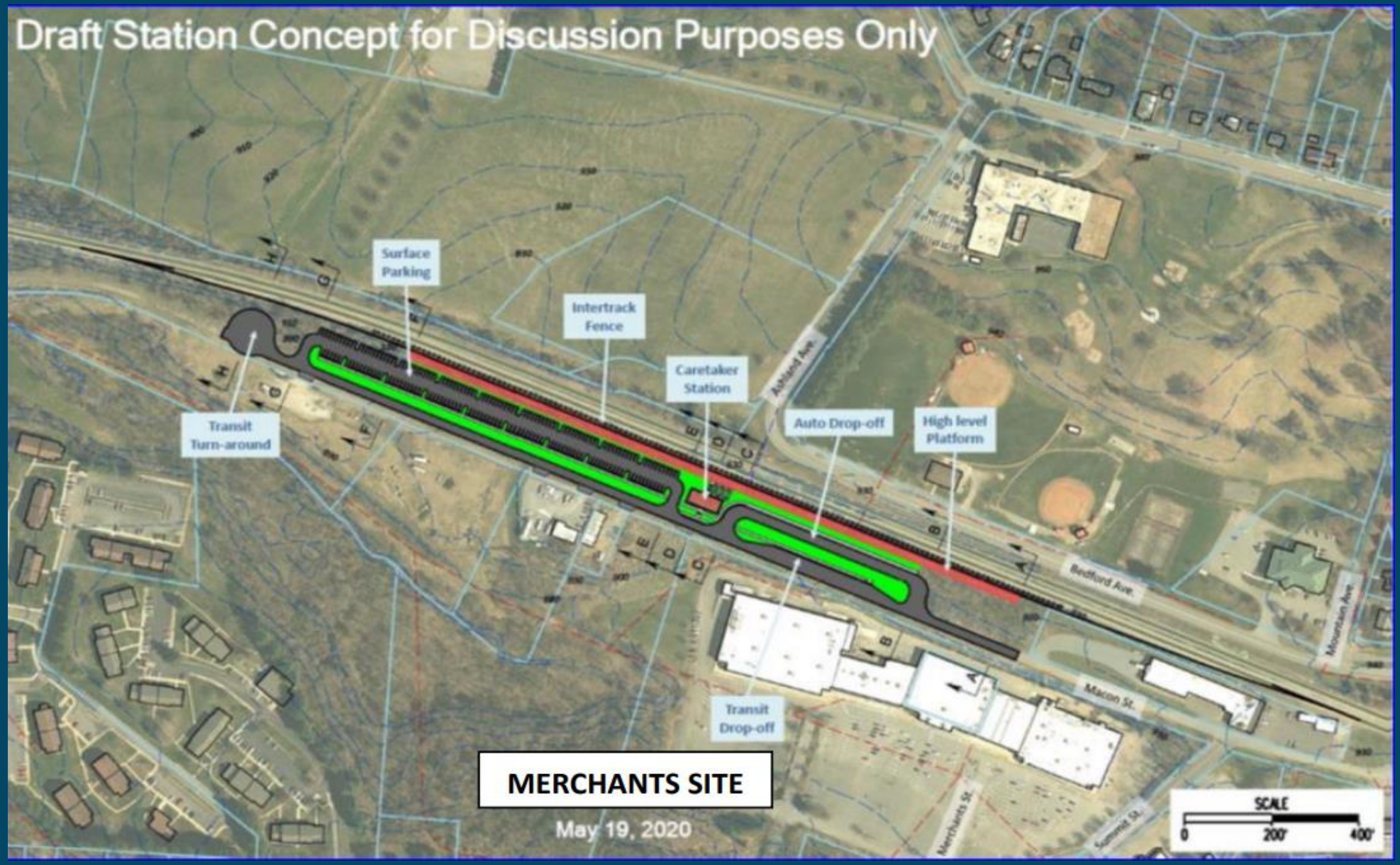
01 Project Scope

Assess the delay introduced by the addition of an Amtrak passenger rail station stop at Bedford, Virginia on track shared with freight and intercity passenger operations between Coolwell and Riverside.

Determine infrastructure and/or operational changes necessary to return operational fluidity of all types of trains to at least the operational fluidity of the Baseline (without Bedford station stop) Scenario.



02 Bedford Station – Conceptual Design (from agreement)



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02 Bedford Station
NS Passenger Policy

- The General Principles guiding Norfolk Southern's evaluation of passenger station proposals provides that "Stations located along a double-track segment should have platforms adjacent to each outside main line."
- Evaluation of the Merchant's site as a single sided station assumes a less-than-desirable configuration that would demonstrate the worst-case impact scenario.
- Additional time may need to be added in the Amtrak schedule to accommodate a single platform on a single, divergent track.

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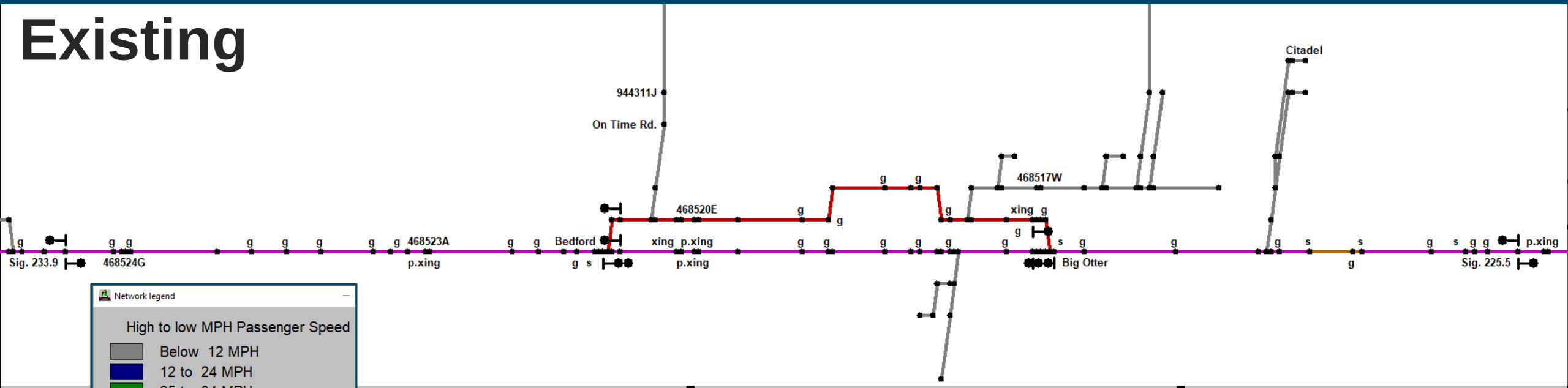
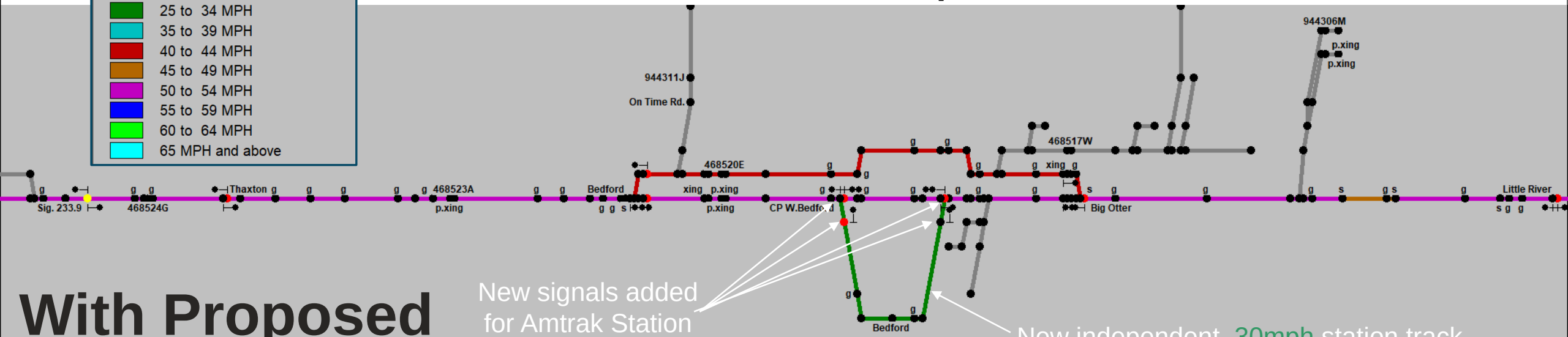
02 Bedford Station - RTC

Existing



With Proposed Bedford Station

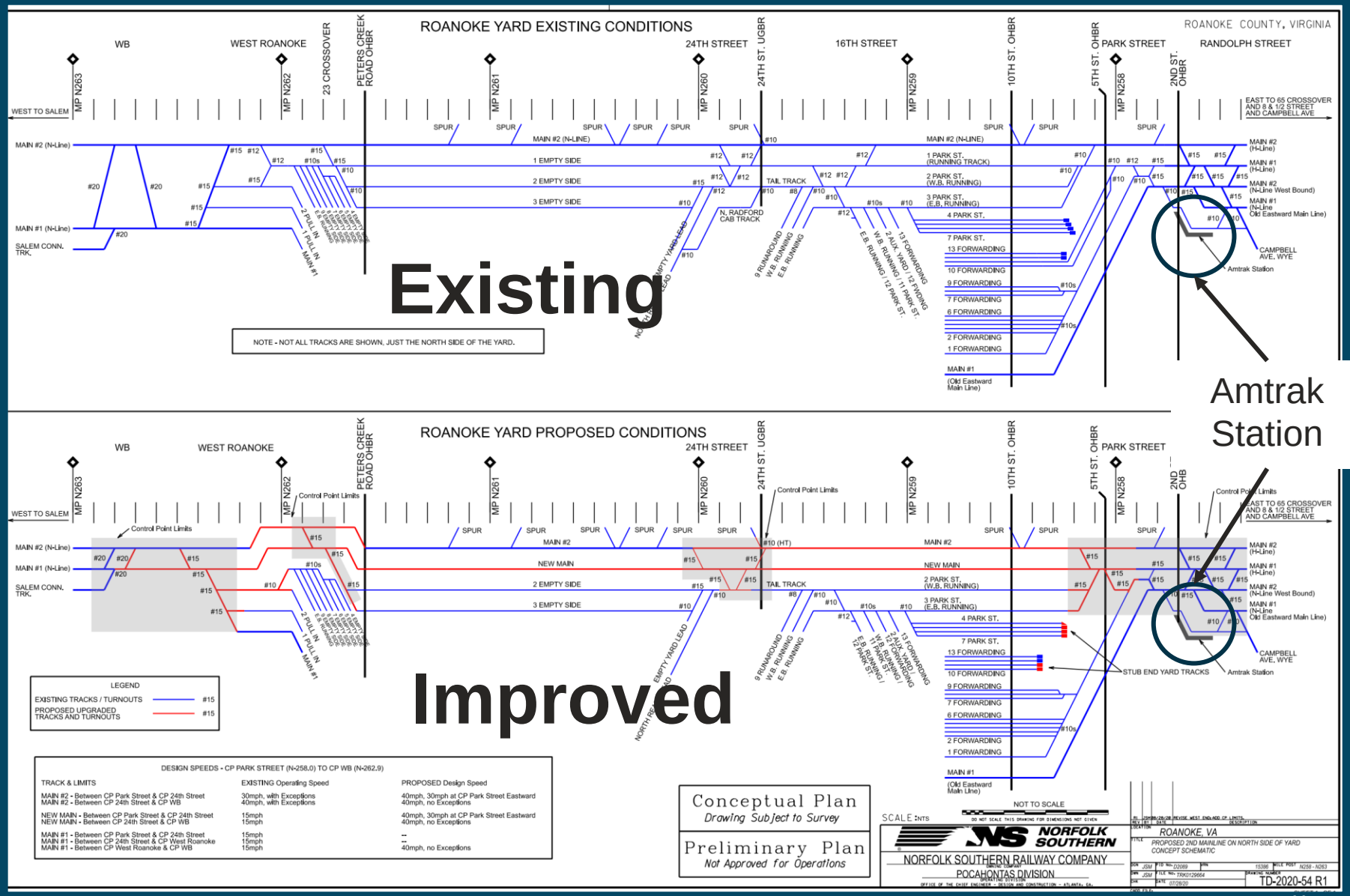


New signals added for Amtrak Station

New independent, 30mph station track with 30mph turnouts

03 Roanoke Improvements

- Created 2nd Main on North side of yard
- Upgraded tracks to 40mph
- Upgraded Turnouts (15mph to 30mph) between two mains



Amtrak Station

04 Modeling Assumptions - RTC study agreement

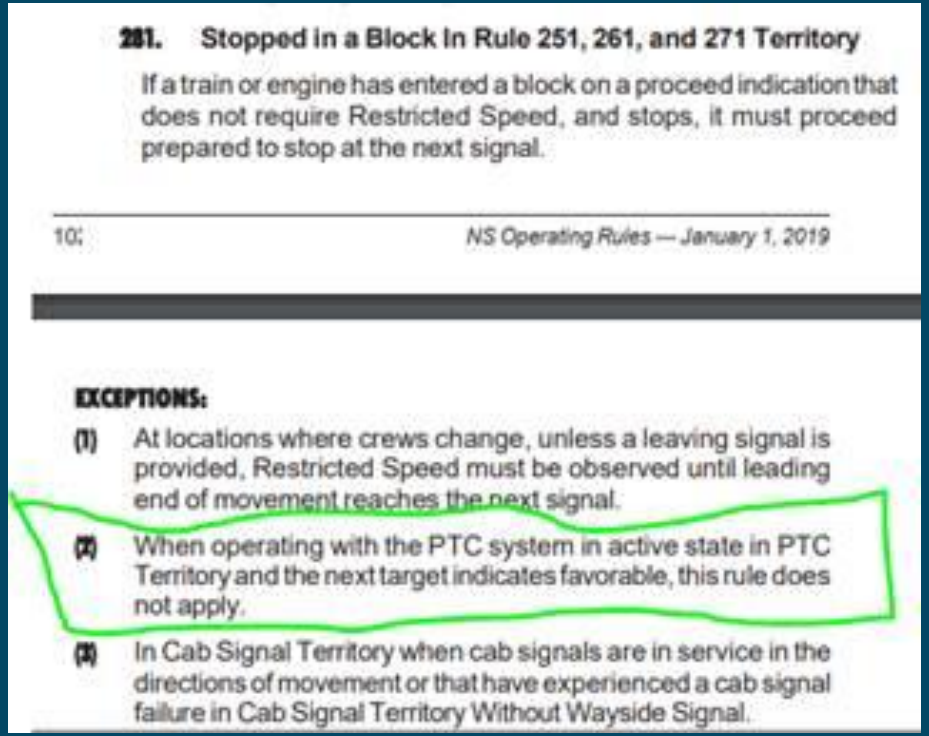
Defined assumptions outlined in Exhibit C - Scope of Work in "Agreement to Assess the Proposed Bedford Station" between VPRA and Norfolk Southern Railway Company

- The study used Berkeley Simulation Software LLC., Rail Traffic Controller Model
  - Version 75T (64-bit) was used, August 3, 2021 release date
- Maximum authorized speed for model: 79 mph (Amtrak)
- Freight trains randomized as 15 minutes early to 15 minutes late for departures
- Key Metric for simulation output: delay minutes per 100 train miles by train type
- Passenger trains always depart initial station on time
- For late passenger trains, model assumes full dwell time at station stops
- Each simulation run a minimum of 10 times with randomization and results averaged
- Trains dispatched in accordance with normal NS priorities by Train Type
  - Passenger first, then Intermodal, then non-Intermodal, then everything else

04 Modeling Assumptions - PTC & Passenger Protection

- PTC is active on all Amtrak Routes
  - RTC enforces PTC
- No adjacent signal block protection is required (Rule 281) if PTC is active
  - No need to model in RTC
- Rule EQ-32, “Protecting Passenger Trains”: PTC enforces protection
  - No need to model in RTC

Rule 281



281. Stopped in a Block In Rule 251, 261, and 271 Territory

If a train or engine has entered a block on a proceed indication that does not require Restricted Speed, and stops, it must proceed prepared to stop at the next signal.

10: *NS Operating Rules — January 1, 2019*

EXCEPTIONS:

(1) At locations where crews change, unless a leaving signal is provided, Restricted Speed must be observed until leading end of movement reaches the next signal.

(2) When operating with the PTC system in active state in PTC Territory and the next target indicates favorable, this rule does not apply.

(3) In Cab Signal Territory when cab signals are in service in the directions of movement or that have experienced a cab signal failure in Cab Signal Territory Without Wayside Signal.

04 Other RTC modeling assumptions

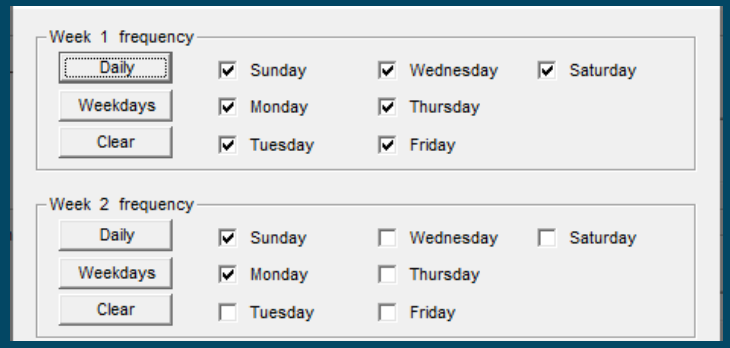
- 2019 traffic based on actual historical train movements from September 22 through 30
- 2019 traffic grown or reduced to match 2040 projected traffic
  - If sufficient growth warranted daily service, a new train was scheduled
  - If growth is not sufficient for daily service, then cars were added to existing trains
- Nine-day simulation with no statistics collected during first and last day
- Track Patrols are included and are lowest priority movement

05 2040 Amtrak Schedule – Northbound – NS trains 014, 016

	EB1	EB2
Roanoke, VA (Dp)	6:22 AM	4:32 PM
Lynchburg, VA	7:38 AM	5:48 PM

Roanoke-Lynchburg-76 minutes

Provided by VPRA



All Trains 7 days per week

	EB1	EB2
Roanoke, VA (Dp)	6:22 AM	4:32 PM
Bedford, VA	7:00 AM	5:10 PM
Lynchburg, VA (Ar)	7:43 AM	5:53 PM

Roanoke-Lynchburg-81 minutes
+5 minutes

Provided by VPRA

In RTC - 2 Daily Trains

	Node	Node Location	Field Milepost	Requested Arrival DD:HH:MM	Requested Departure DD:HH:MM	Dwell HH:MM:SS
1	62V-261.6002	g	261.600	FLOAT	5:48	0
2	62N-257.500P	Roanoke	257.500	FLOAT	6:22	5:00
3	03--172.4501	Lynchburg	172.450	FLOAT	7:38	3:00
4	03--160.8601		160.860	FLOAT	FLOAT	0

	Node	Node Location	Field Milepost	Requested Arrival DD:HH:MM	Requested Departure DD:HH:MM	Dwell HH:MM:SS
1	62V-261.6002	g	261.600	FLOAT	15:58	0
2	62N-257.500P	Roanoke	257.500	FLOAT	16:32	5:00
3	03--172.4501	Lynchburg	172.450	FLOAT	17:48	3:00
4	03--160.8601		160.860	FLOAT	FLOAT	0

In RTC - 2 Daily Trains With Bedford Stop

	Node	Node Location	Field Milepost	Requested Arrival DD:HH:MM	Requested Departure DD:HH:MM	Dwell HH:MM:SS
1	62V-261.6002	g	261.600	FLOAT	5:48	0
2	62N-257.500P	Roanoke	257.500	FLOAT	6:22	5:00
3	62N-229.110P	Bedford	229.110	FLOAT	7:00	2:00
4	03--172.4501	Lynchburg	172.450	FLOAT	7:43	3:00
5	03--160.8601		160.860	FLOAT	FLOAT	0

	Node	Node Location	Field Milepost	Requested Arrival DD:HH:MM	Requested Departure DD:HH:MM	Dwell HH:MM:SS
1	62V-261.6002	g	261.600	FLOAT	15:58	0
2	62N-257.500P	Roanoke	257.500	FLOAT	16:32	5:00
3	62N-229.110P	Bedford	229.110	FLOAT	17:10	2:00
4	03--172.4501	Lynchburg	172.450	FLOAT	17:53	3:00
5	03--160.8601		160.860	FLOAT	FLOAT	0

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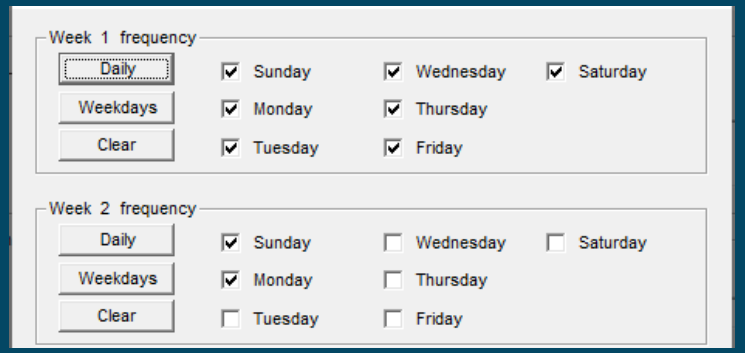
05 2040 Amtrak Schedule – Southbound – NS trains 013, 015

	WB1	WB2
Lynchburg, VA	12:29 PM	8:29 PM
Roanoke, VA (Ar)	1:45 PM	9:45 PM

Lynchburg-Roanke-76 minutes

Provided by VPRA



All Trains 7 days per week

	WB1	WB2
Lynchburg, VA (Dp)	12:29 PM	8:29 PM
Bedford, VA	1:10 PM	9:10 PM
Roanoke, VA (Ar)	1:50 PM	9:50 PM

Lynchburg-Roanke-81 minutes
+5 minutes

Provided by VPRA

In RTC - 2 Daily Trains

	Node	Node Location	Field Milepost	Requested Arrival DD:HH:MM	Requested Departure DD:HH:MM	Dwell HH:MM:SS
1	03--164.1402		164.140	FLOAT	12:17	0
2	03--172.5001	Lynchburg	172.500	FLOAT	12:29	3:00
3	62N-257.720P	Roanoke	257.720	FLOAT	13:45	5:00
4	62V-261.7101	Kumis	261.710	FLOAT	FLOAT	0

In RTC - 2 Daily Trains With Bedford Stop

	Node	Node Location	Field Milepost	Requested Arrival DD:HH:MM	Requested Departure DD:HH:MM	Dwell HH:MM:SS	D
1	03--164.1402		164.140	FLOAT	12:17	0	
2	03--172.5001	Lynchburg	172.500	FLOAT	12:29	3:00	
3	62N-229.420P	Bedford	229.420	FLOAT	13:10	2:00	
4	62N-257.720P	Roanoke	257.720	FLOAT	13:50	5:00	
5	62V-261.7101	Kumis	261.710	FLOAT	FLOAT	0	

	Node	Node Location	Field Milepost	Requested Arrival DD:HH:MM	Requested Departure DD:HH:MM	Dwell HH:MM:SS
1	03--164.1402		164.140	FLOAT	20:17	0
2	03--172.5001	Lynchburg	172.500	FLOAT	20:29	3:00
3	62N-257.720P	Roanoke	257.720	FLOAT	21:45	5:00
4	62V-261.7101	Kumis	261.710	FLOAT	FLOAT	0

	Node	Node Location	Field Milepost	Requested Arrival DD:HH:MM	Requested Departure DD:HH:MM	Dwell HH:MM:SS	D
1	03--164.1402		164.140	FLOAT	20:17	0	
2	03--172.5001	Lynchburg	172.500	FLOAT	20:29	3:00	
3	62N-229.420P	Bedford	229.420	FLOAT	21:10	2:00	
4	62N-257.720P	Roanoke	257.720	FLOAT	21:50	5:00	
5	62V-261.7101	Kumis	261.710	FLOAT	FLOAT	0	

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05 2040 Amtrak - Consist

Provided by VPRA

Schedules with Bedford stop
- Base assumptions use Lynchburg to Roanoke runtimes based on current runtimes as displayed in public timetables
- For calculation of stopping/starting at Bedford, Acceleration and deceleration based on 1 P42 and 6 cars
- Dwell of 2 minutes assumed for Bedford stop
  - Additional dwell is a 1:1 addition of total runtime
- Schedules based on Phase 1 and Phase 2 schedules from the *Transforming Rail in Virginia* effort

in RTC – Consist for all Amtrak Trains

	Node	Node Location	Field Milepost	Departing Loads	Departing Empties	Trailing Departing Tons	Trailing Departing Feet	Total Departing Tons	Type 1 Locomotive	Type 1 Train Position	Type 1 Number Running	Type 1 Number Isolated
1	03--164.1402		164.140	6	0	371	564	505	P42-DC	Front	1	0
2	03--172.5001	Lynchburg	172.500	6	0	371	564	505	P42-DC	Front	1	0
3	62N-257.720P	Roanoke	257.720	6	0	371	564	505	P42-DC	Front	1	0
4	62V-261.7101	Kumis	261.710	6	0	371	564	505	P42-DC	Front	1	0

05 2040 vs. 2019 Traffic Volume – Net Changes

- **Growth of freight volumes based on NS historic trends, NS Marketing forecast, and Moody's GDP forecast**
- **Net of 12 NS Trains Added (+1.3 per day)**
- **Also made 191 trains longer (21.2 per day)**
- **+11.5% in overall combined train length**

07 Three Scenarios Defined for this study

Base Case (year 2040)

- Future NS operations
  - 2019 traffic plus expected growth
- Current infrastructure plus improvements by 2040
  - Roanoke
  - Bedford Station
- Amtrak schedules
  - Two roundtrips daily
  - Schedule per agreement
  - No Bedford Station Stop

Modified Case (year 2040)

- Future NS operations
  - 2019 traffic plus expected growth
- Current infrastructure plus improvements by 2040
  - Roanoke
  - Bedford Station
- Amtrak schedules
  - Two roundtrips daily
  - Schedule per agreement
  - Add Bedford Station Stop

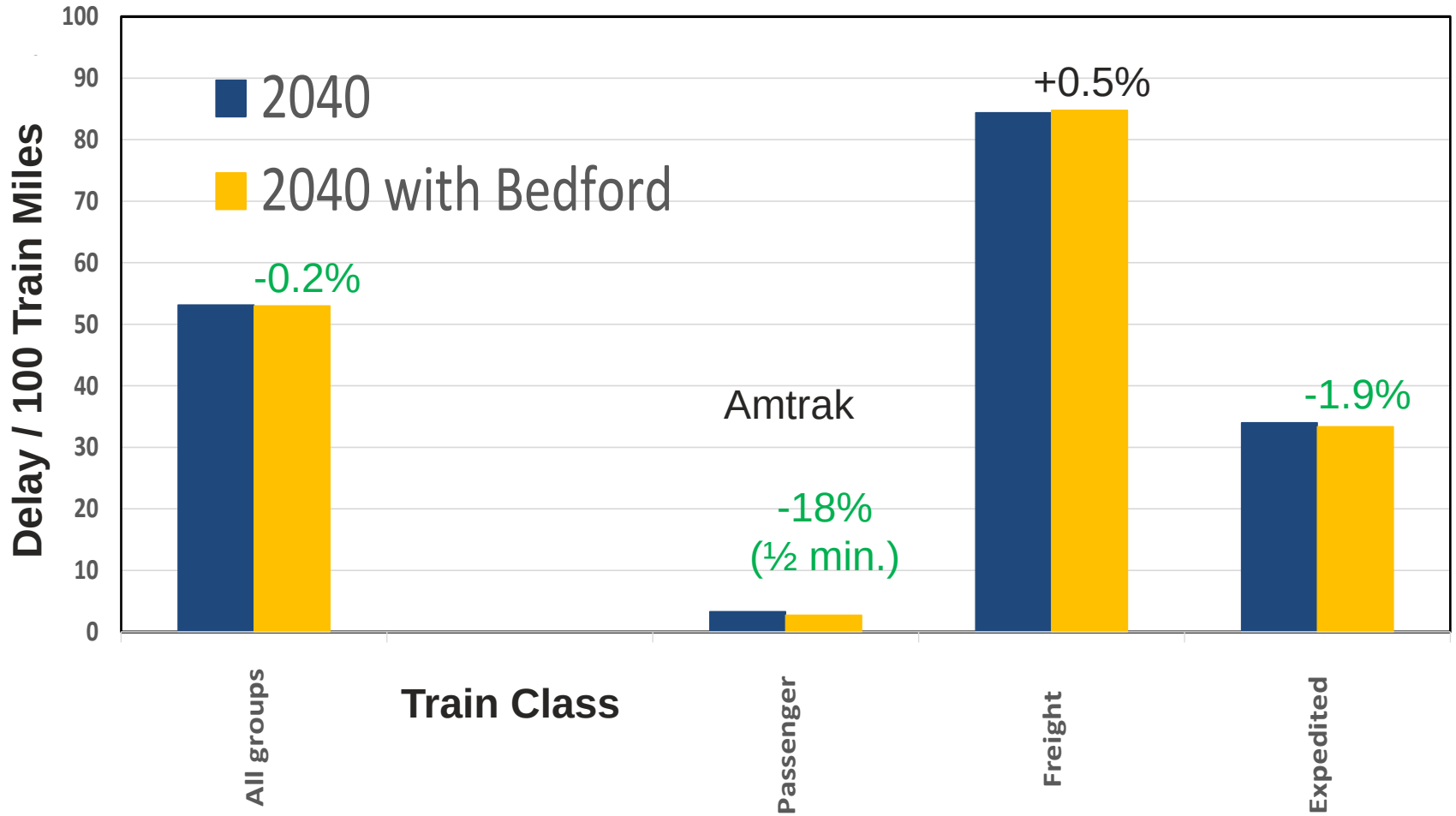
Improved Case (year 2040)

- Future NS operations
  - 2019 traffic plus expected growth
- Current infrastructure plus improvements by 2040
  - Roanoke
  - Bedford Station
  - +Infrastructure / Changes
- Amtrak schedules
  - Two roundtrips daily
  - Schedule per agreement
  - Add Bedford Station Stop

08 Simulation Shows Negligible Added Delay

2040 with & without Bedford Station Stop

- **Overall, there is negligible added delay with Bedford Station**
- **Amtrak performance is slightly better**



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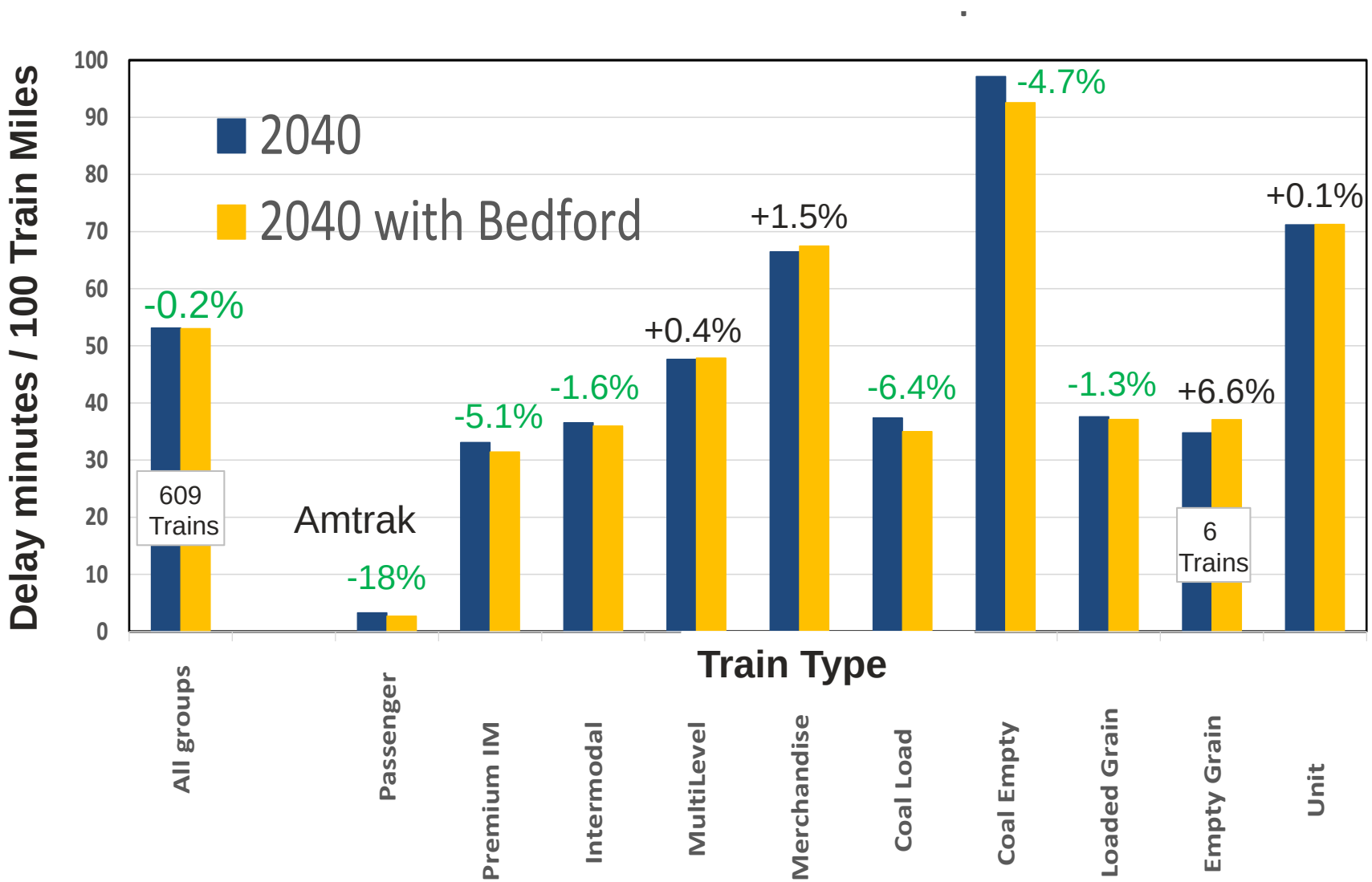
08 Simulation Shows Negligible Added Delay by Train Type

2040 with & without Bedford Station Stop

- Overall, there is negligible added delay with Bedford Station

- Trains with less delay
  - Amtrak
  - intermodal
  - Coal
  - grain loads

- Trains with more delay
  - multilevel
  - merchandise
  - empty grain
  - unit



09 Study Conclusion
Proposed Amtrak Station @ Bedford

- Addition of Bedford Station stop creates non-material new delay to Norfolk Southern operations
- This assumes that Amtrak schedules do not deviate from those given in this study and that Amtrak does not add service on any part of the study area above what is included in this study
- No “Improved Case (year 2040)” scenario is needed for analysis as the assumed 2040 infrastructure (as defined in this document) results in no material increase in fluidity impairment.

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