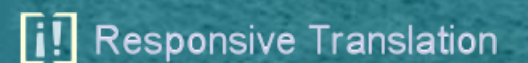
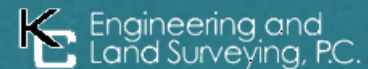




SOUTHEAST TO DANBURY RAIL LINK FEASIBILITY STUDY

NYMTC “BROWN BAG” LUNCH REVIEW

■ January 25, 2023





SESSION INFORMATION

Today's Speakers:

Vincent Tamagna, Putnam County Project Manager
Drew Galloway, WSP Project Manager



STUDY BACKGROUND

- NYMTC sponsored Federal funding to support assessment of the regional market and interest for rail services connecting Southeast, NY to Danbury, CT
- Study evaluated the feasibility for passenger rail service connecting Southeast to Danbury
 - Potential extension of Metro-North's Harlem Line to Danbury Line or further northeast
 - Stand-alone service alternatives with coordinated transfers
- Improves quality of life / local economies
 - Improved travel experience to/from NYC
 - Alternative to auto commute times and traffic congestion on I-684/I-84, local roads
 - Stations accessible to jobs, shopping, activity centers, parks and attractions, housing



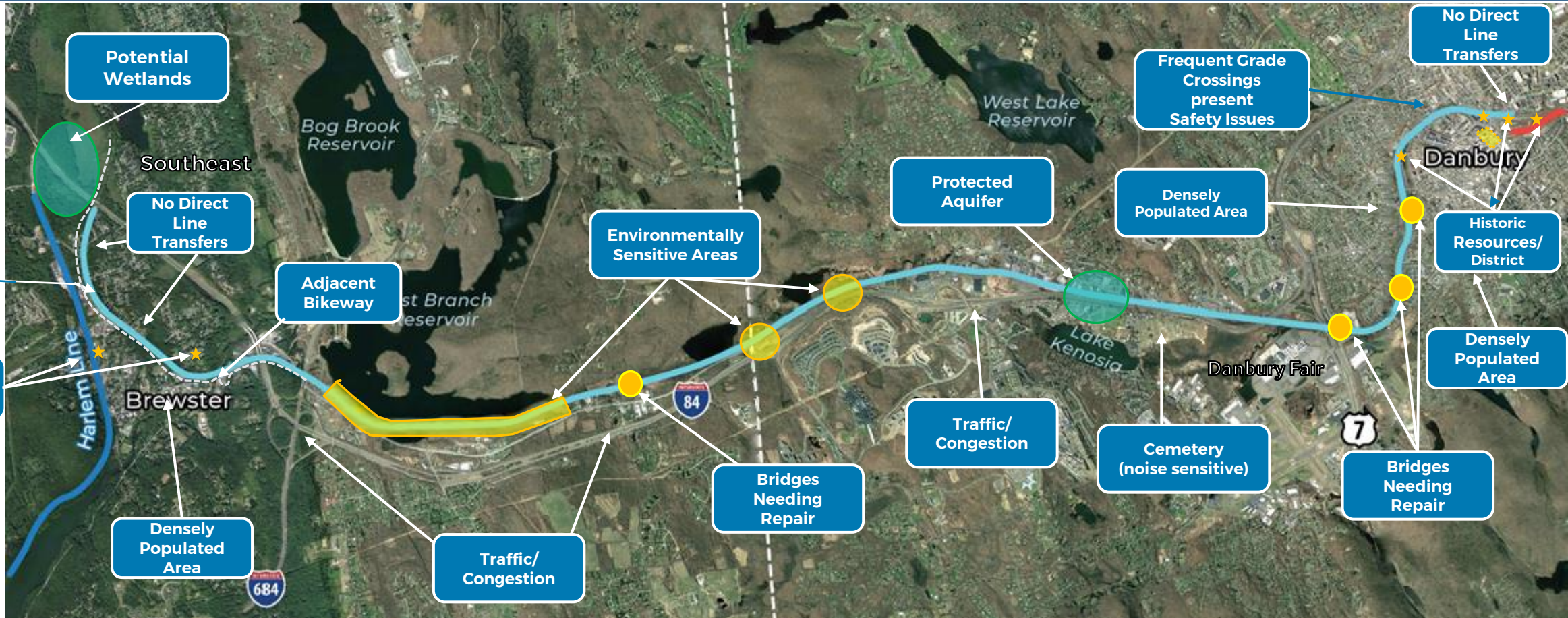
Rail Line today is referred to as the "Beacon Line"

Historically known as the "Maybrook Line"



SE2D

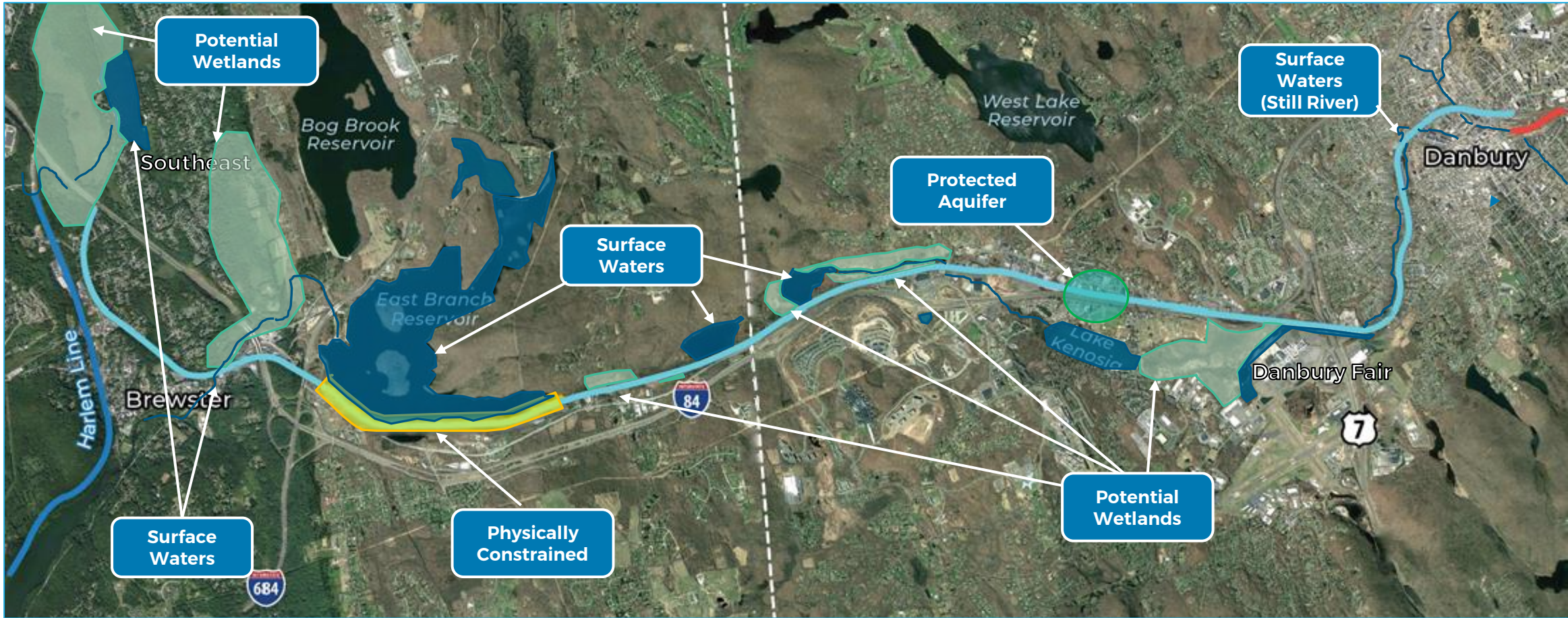
EXISTING CORRIDOR CONDITIONS



— Beacon Line — Harlem Line — Danbury Line

While there are current connections further away, trains would need to make directional changes to transfer between lines, slowing operations significantly

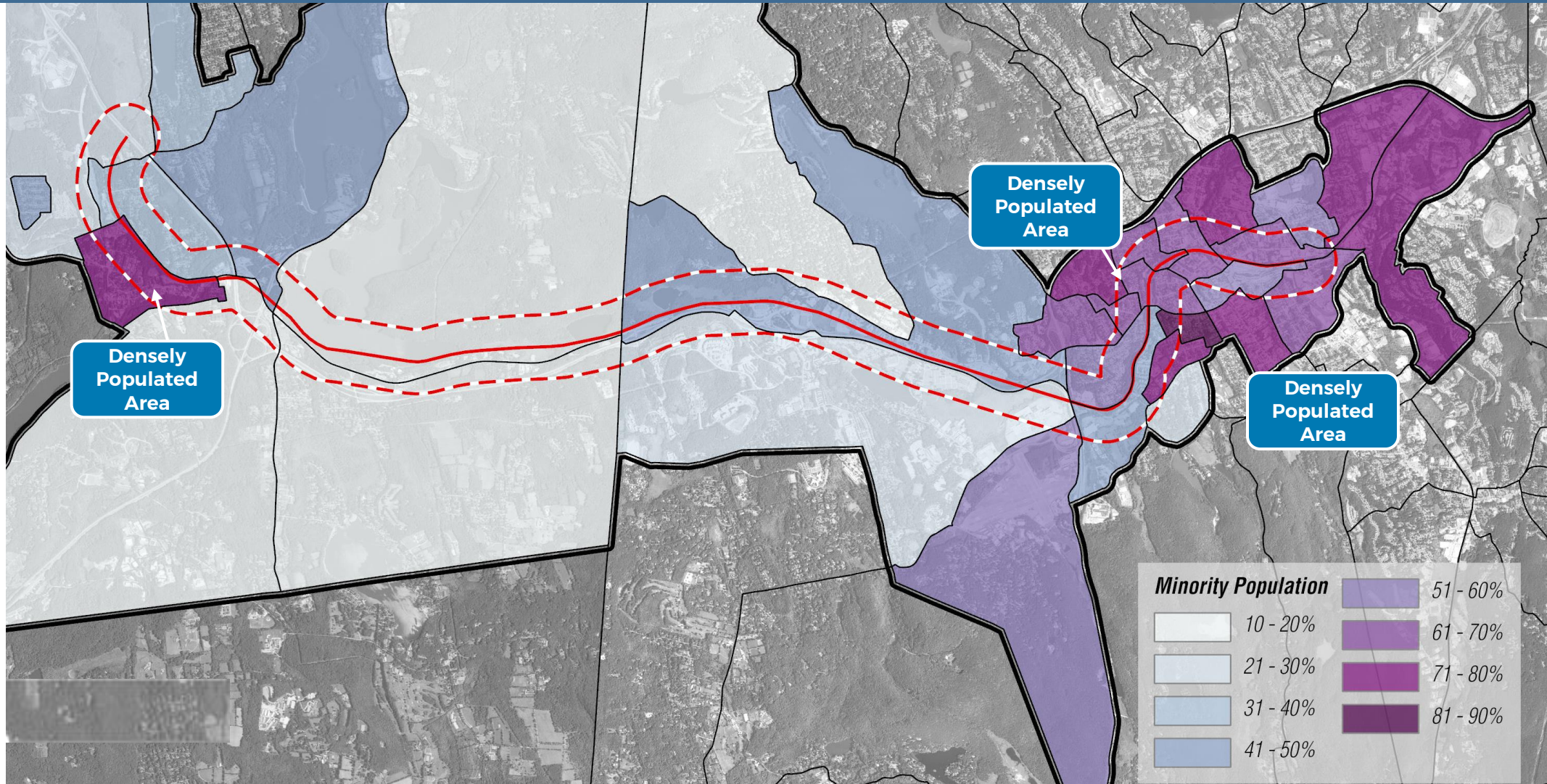




— Beacon Line
 — Harlem Line
 — Danbury Line

While there are many waterbodies through the corridor, the most significant is the East Branch Reservoir

A diverse population throughout the corridor...



Special consideration of the Maybrook Bikeway and others that traverse the same corridor was made in developing designs



Maybrook Bikeway in vicinity of Exit 10 I-684 courtesy of N.Shute



- Trailway will require special consideration in alternatives development
- Many locations where the railroad is directly adjacent to sensitive water resources
- Increased likelihood of environmental justice considerations at the “ends” of the rail corridor
 - Connections should strive to minimize property takings
- Large number of rail bridges will need replacement (16 throughout the corridor)
- Localized residential as well as other noise-sensitive land uses are directly adjacent to the rail corridor



Existing rail and new pedestrian bridges at Joes Hill Road



Adjacent homes in Danbury, (North of West Street)



Beacon Line

Harlem Line

Danbury Line

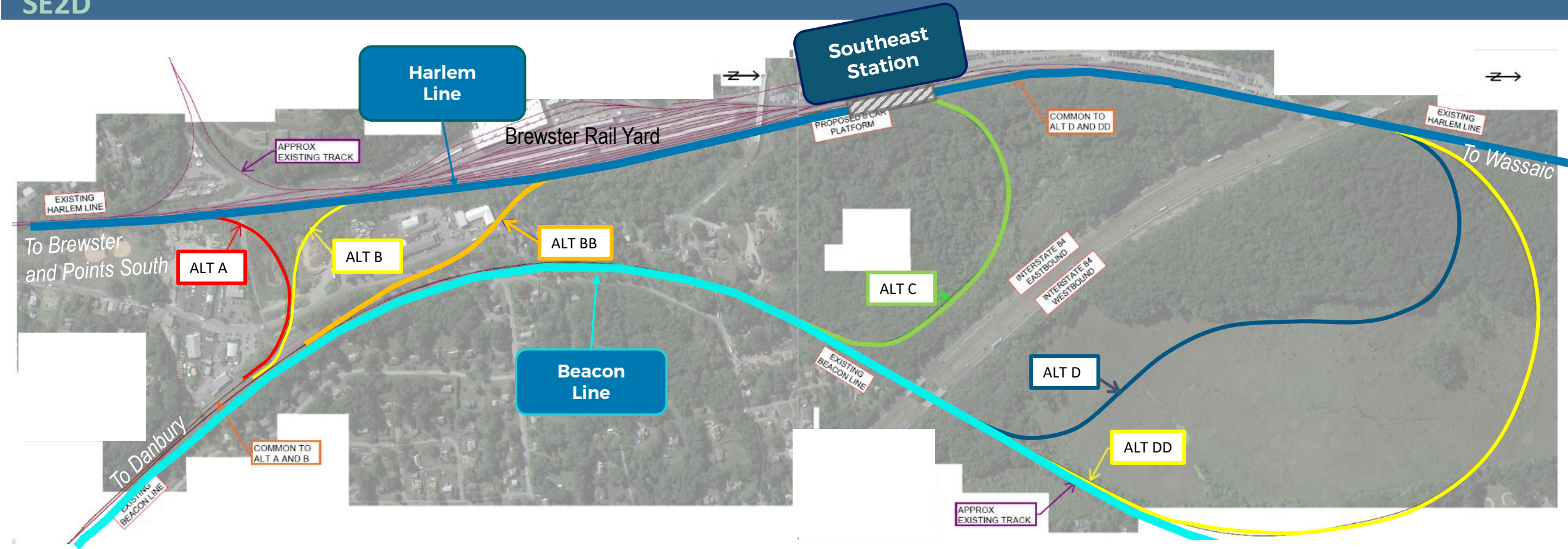


ALTERNATIVES DEVELOPMENT

Infrastructure – Rail Line Connections

- Infrastructure options to link the Beacon Line with existing rail routes
 - Current track alignment does not provide useful connections to the Harlem Line and Danbury Line
 - Series of 10 different main track and station connections were developed for linking the two Metro-North lines
- All concepts influenced by substantial track curvature at the intersecting points between the Beacon Line and the other rail lines.
- All connections have some environmental, community, and property impacts associated with them



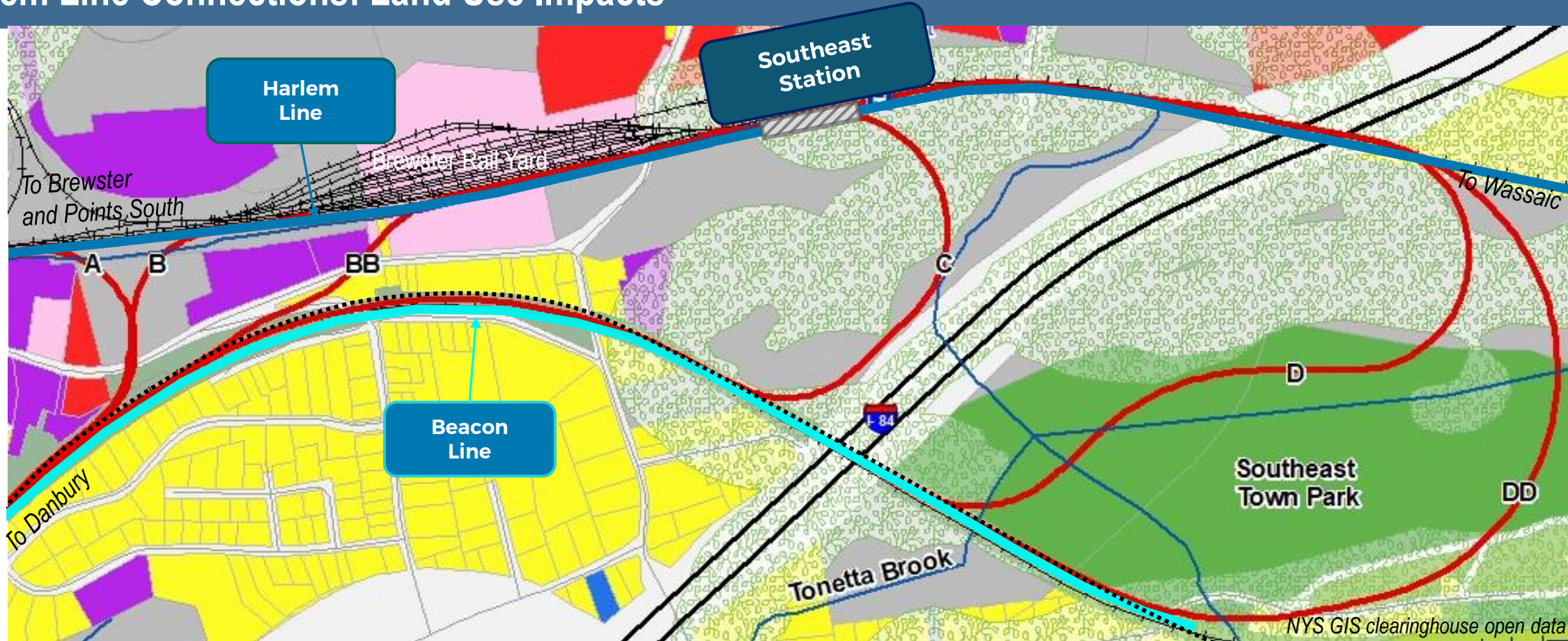


- 6 Connection Alternatives Developed
 - 3 South of Southeast Station
 - 3 North of Southeast Station
- Alternatives BB/DD offer the greatest flexibility



Legend

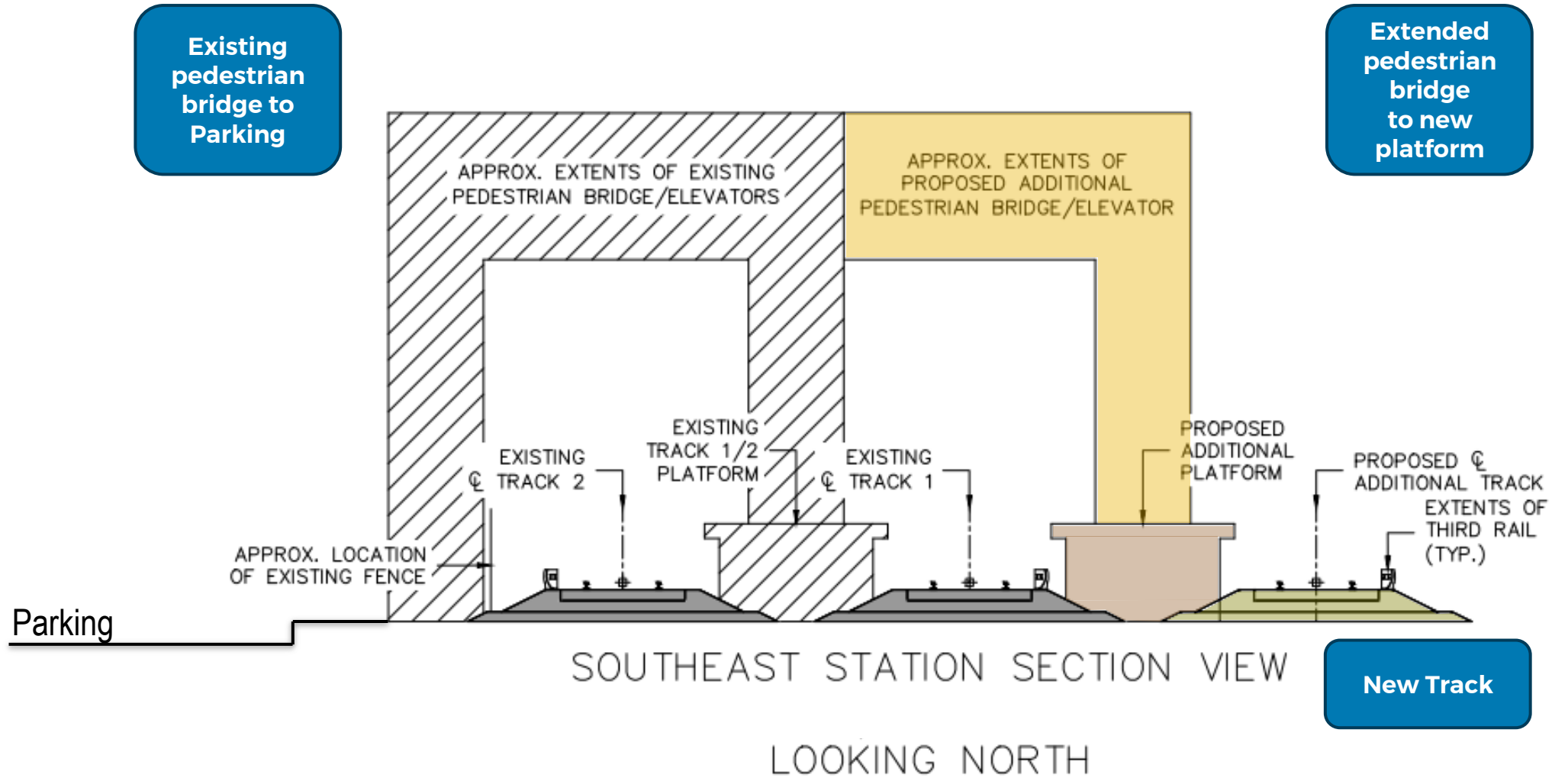
- Bikeway
- Project Corridor
- Railroads
- Interstates
- Open Space
- NYSDEC Wetlands
- Surface Waters
- Tonetta Brook
- Vacant
- Residential
- Commercial
- Industrial
- Transportation/ Utility



NYS GIS clearinghouse open data

- All alternatives will need to interact with the bikeway
- While alternative B appears to have more modest impact, it is operationally limited with very slow speeds







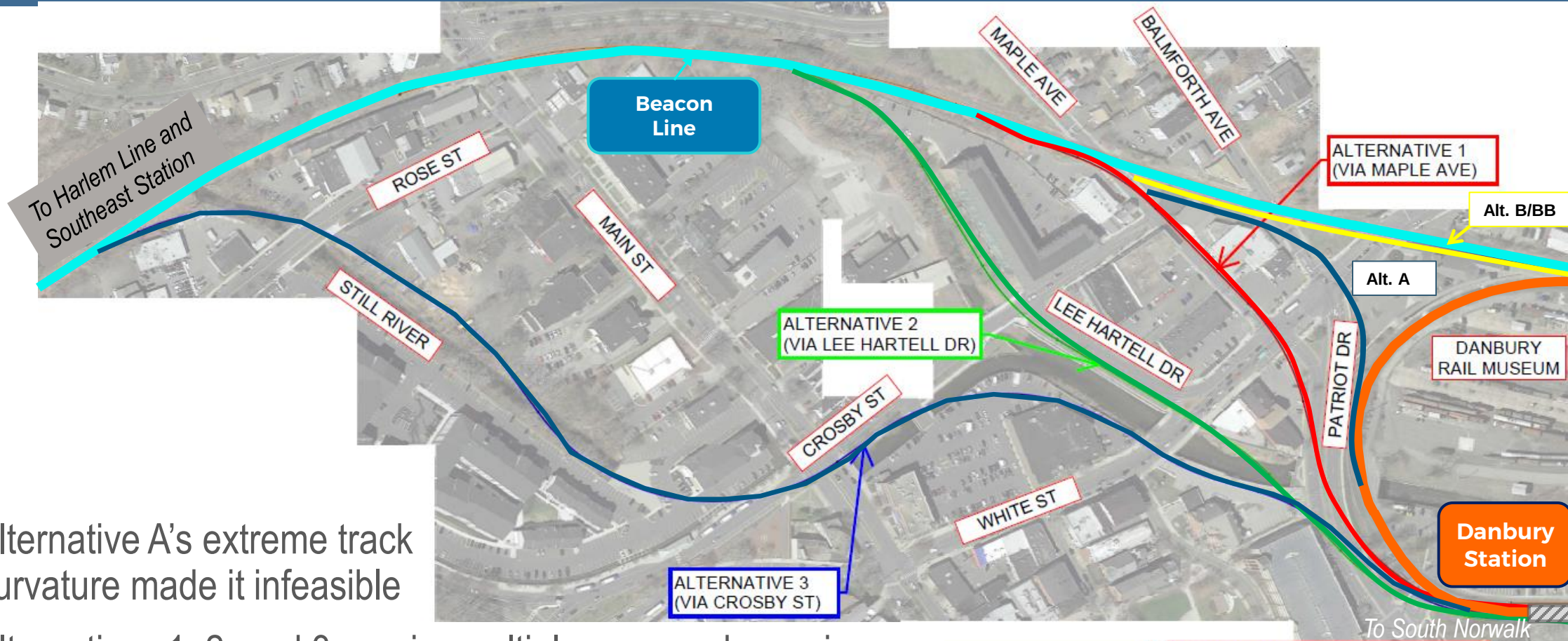
ALTERNATIVES DEVELOPMENT

Infrastructure: Danbury Connections

- 4 Alternatives developed to directly connect to the current Danbury Line station
 - Require new track alignments and right-of-way
 - Would be located on varying city streets and/or through adjacent structures
 - Would require multiple crossings or impacts of two water courses

- 2 Alternatives developed to reactivate the former Beacon (Maybrook) Line station site
 - Would remain within existing Beacon Line right-of-way
 - Would provide new station facilities adjacent to the Railway Museum building
 - Would provide direct pedestrian connection between the two stations



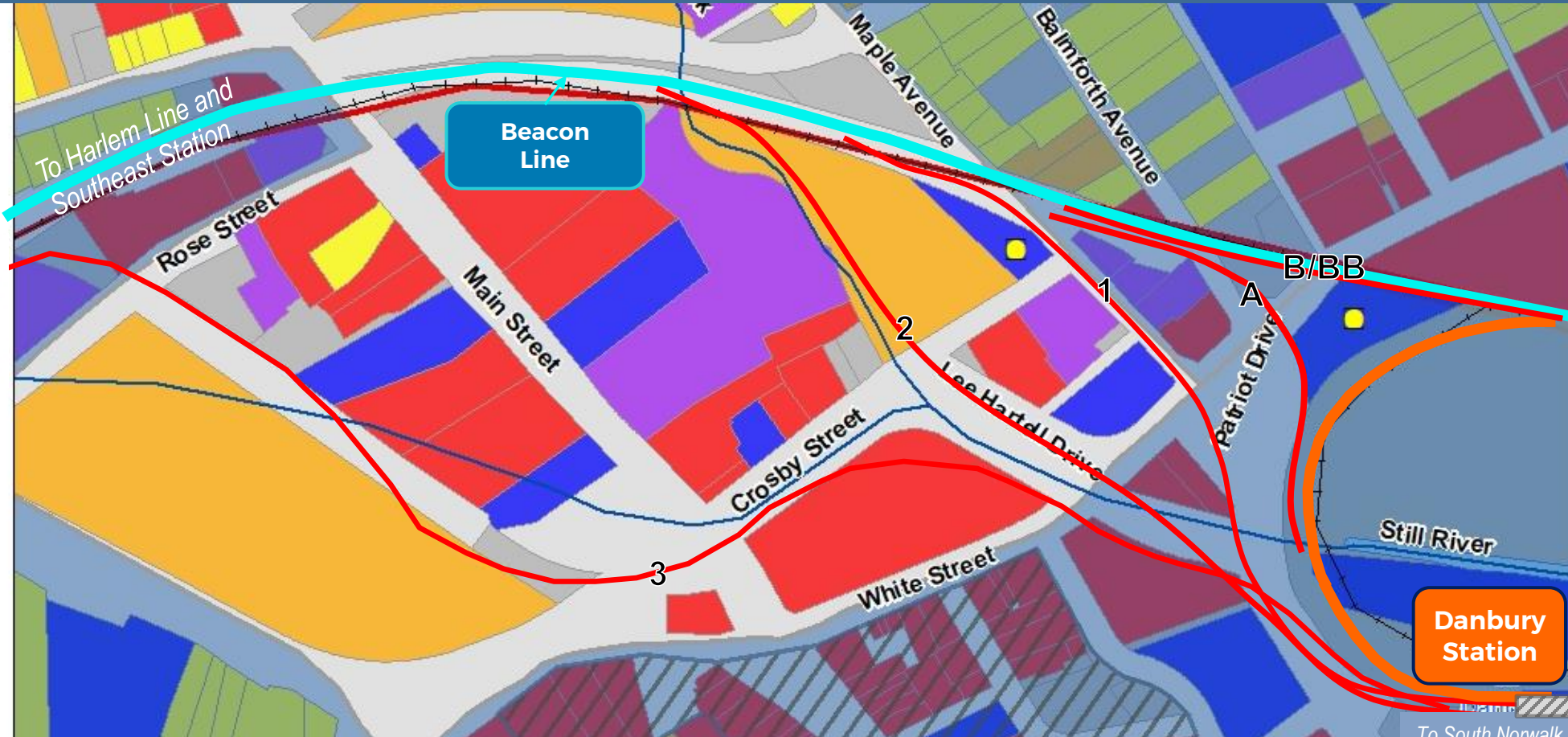


- Alternative A's extreme track curvature made it infeasible
- Alternatives 1, 2, and 3 require multiple new road crossings
- Alternative 1 was initially developed as a street running option
- Alternatives B/BB offer the least impacts and greater flexibility



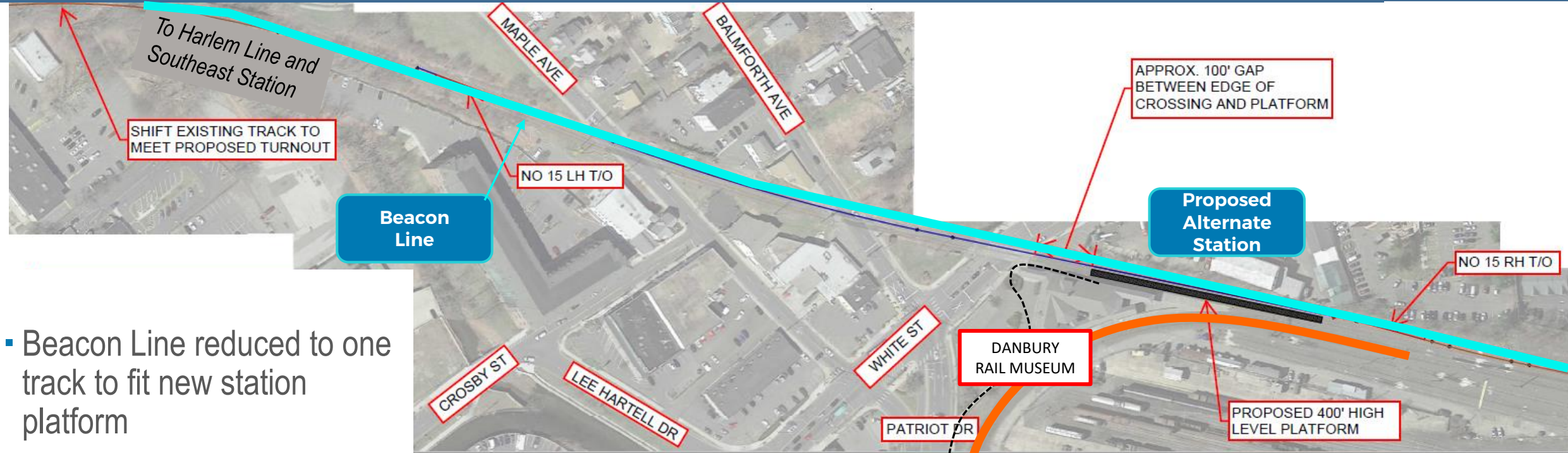
Legend

- Project Corridor
- + + Railroads
- Rivers/ Streams
- Surface Waters
- Main Street Historic District
- Environmental Justice Areas
- S/NR Listed Historic Resource
- Residential
- Commercial
- Industrial
- Transportation/ Utility
- Vacant
- Multi-family Residential
- Public Utility / Service



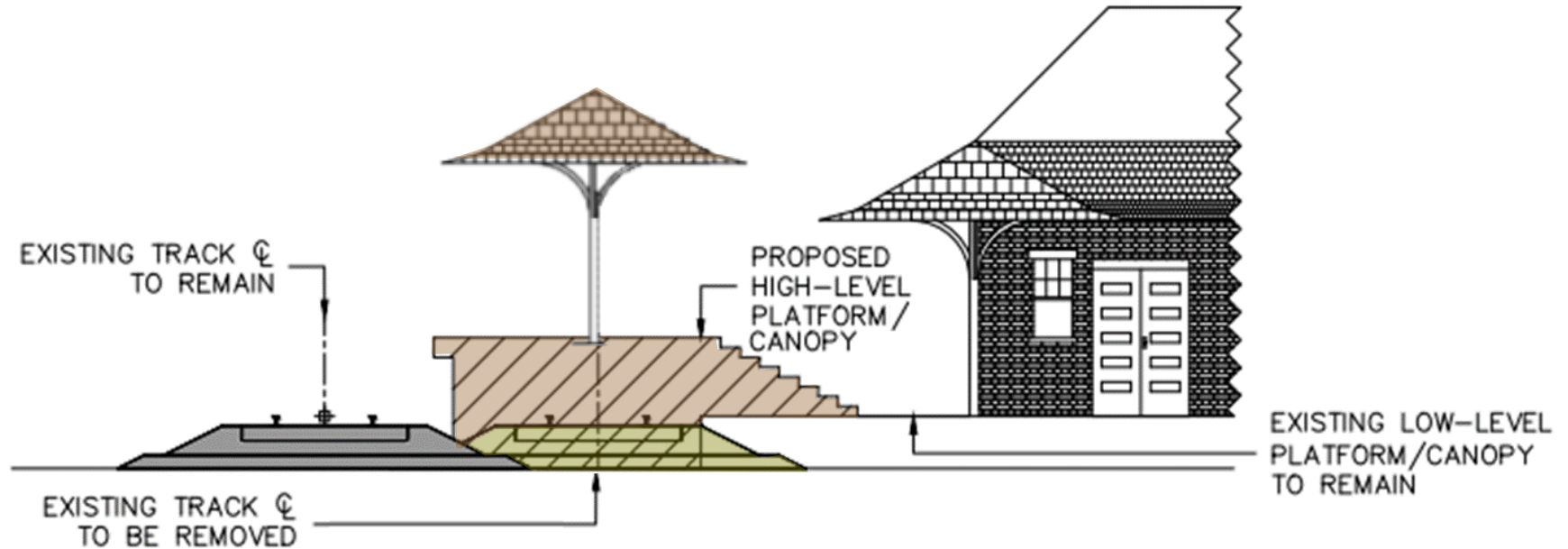
- Alternatives A, 1, 2, and 3 greatly impact the downtown
- Alternatives B/BB offer the least impacts





- Beacon Line reduced to one track to fit new station platform





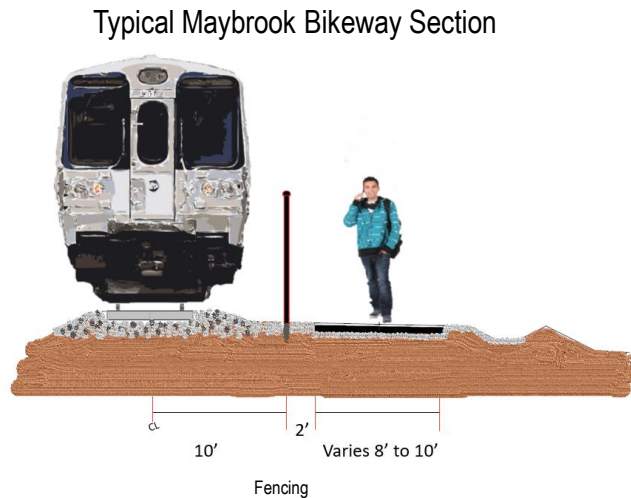
DANBURY MUSEUM/STATION SECTION VIEW

LOOKING EAST



— Beacon Line
 — Harlem Line
 — Danbury Branch
 — Existing Double Track Territory

- Consideration of the corridor's safety and security was undertaken to identify potential issues and possible mitigations



CATEGORY	MITIGATION or CONTROL
Trespass: (no harm intended, self-harm or harm to system)	Signage, Access Control / Fencing, alignment clear zone (visibility), Reporting procedures – emphasis on co-located bikeway and rail line section(s)
Collisions: Train / Private Vehicle Train / Person(s) Train / Object	Grade crossing protection, pedestrian gates, signal integration, traffic diagnostic study, public education, signage, enforcement, right-of-way obstructions (commercial/geological)
Electrification:	Isolation of electrical components, third rail cover, fencing/access control, grounding, protective devices, signage
Societal Crime: Vagrancy/Graffiti	Random security patrols or presence, crew presence , reporting, jurisdictional agreements for enforcement

There are over 300 trails alongside active rails, similar to the Beacon Line, according to FHWA.

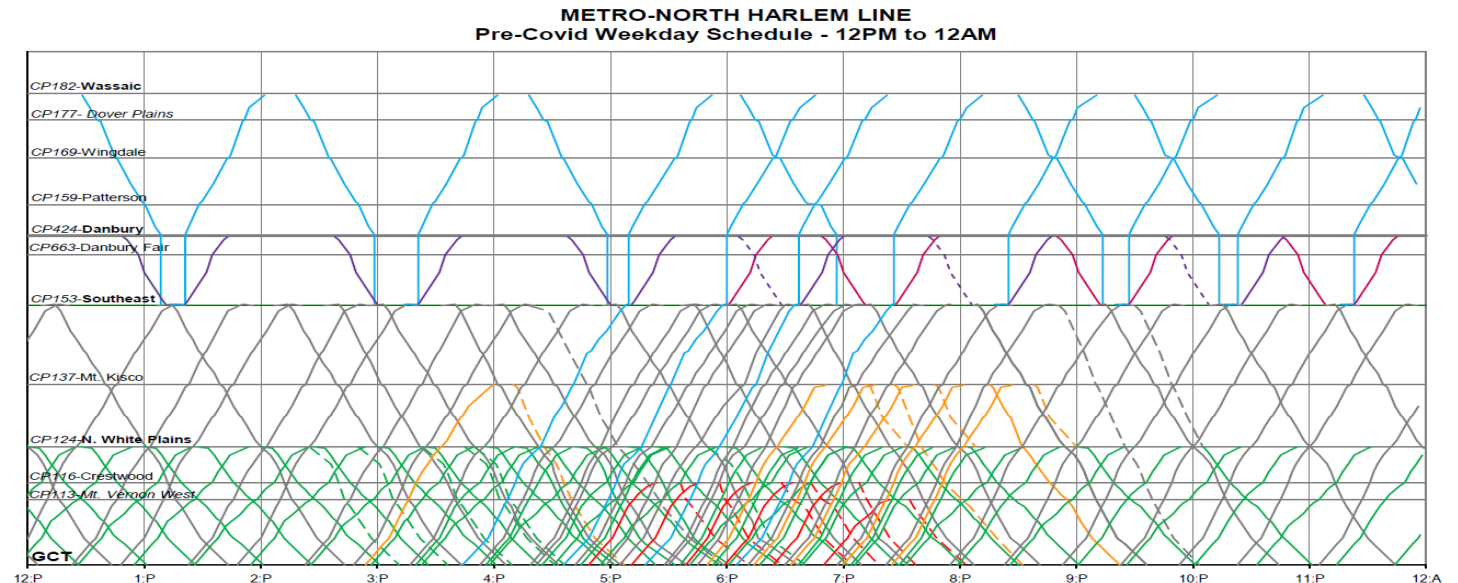
The 2021 *Rails with Trails Manual* suggests that some of the best practices for safety include:

- Ensuring a distance of separation
- Providing intrusion protection via fencing



- Service frequency targets:
 - 30 minutes during peak period - (6-10AM Arrival GCT, 4-8PM Departure GCT)
 - 60-120 minutes during off-peak period
 - 15 minutes for light rail service
- Variation in propulsion, vehicle, and service type were explored
- Existing Metro-North Southeast and Danbury station service levels remain unchanged due to mainline capacity constraints
 - Additional platform edge at Southeast and Danbury recommended to accommodate new services
- Assumes proposed services originate/terminate at Southeast
 - No reduction in service to Southeast Station

Pre-Covid Metro-North Harlem Line
Weekday afternoon service with
Beacon Line alternative included





ALTERNATIVES DEVELOPMENT

Service Planning

Vehicle Type		Possible Service Alternative	Additional Line Infrastructure required?	New Facilities Required?	Other Issues
FRA Compliant Diesel Multiple Unit		Shuttle or Frequent Transit*	Passing Siding, Double Track Extension	Shop/Yard	Limited vehicle providers
FRA Compliant Zero Emission Multiple Unit				Shop/Yard; Recharging for Battery or Refueling for Hydrogen	Battery technology emerging Hydrogen is not widely used
Push-pull Diesel/Electric/Battery Locomotive Hauled		Shuttle, Peak-Period Through*	Passing Siding, Double Track Extension	Could require updates for battery based	Existing fleet availability/compatibility
Electric Multiple Unit		Shuttle, Peak-Period Through*, or Full Service*	Passing Siding, Double Track Extension, 3 rd Rail electrification	No	Presence of 3 rd Rail electrification system
Light Rail Vehicle		Shuttle or Frequent Transit	Two Passing Sidings, Double Track Extension, Overhead electrification	Shop/Yard	Requires separation from others



ALTERNATIVES DEVELOPMENT

Service Planning

	<i>Existing Conditions</i>	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	<i>No Build - Danbury Branch</i>	Shuttle	Peak Through	Full Service	Frequent Transit
Running Time (min)	54	22	22	19	22
Running Time to GCT Peak (min)	122	111	107	104	111
Frequency Peak (min)	40	30	30	30	15
Frequency Off Peak (min)	120-180	120	60-120	60	15
Harlem Line Integration	None	Transfer	Peak through service; off peak transfer	Through service	Transfer
Eastern Terminus	Danbury Station	Danbury Station	Danbury Station	Danbury Station	Danbury Station





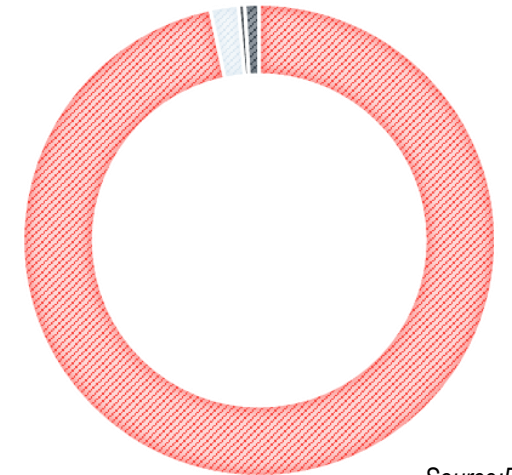
ALTERNATIVES EVALUATION

Ridership Forecasting

- All service alternatives developed within FTA STOPS model of NYMTC area
- Forecasts were calibrated to 2019 Metro-North service plan and 2017 Metro-North On-Board Survey
- 3 Market subsets included
 - Full Service to NYC
 - White Plains
 - Local area
- 2 new intermediate stations included (State Line Park and Ride, Danbury Fair)
- Forecast sensitivity test were made to assess headway reductions and transfer impacts

2019 EMPLOYMENT

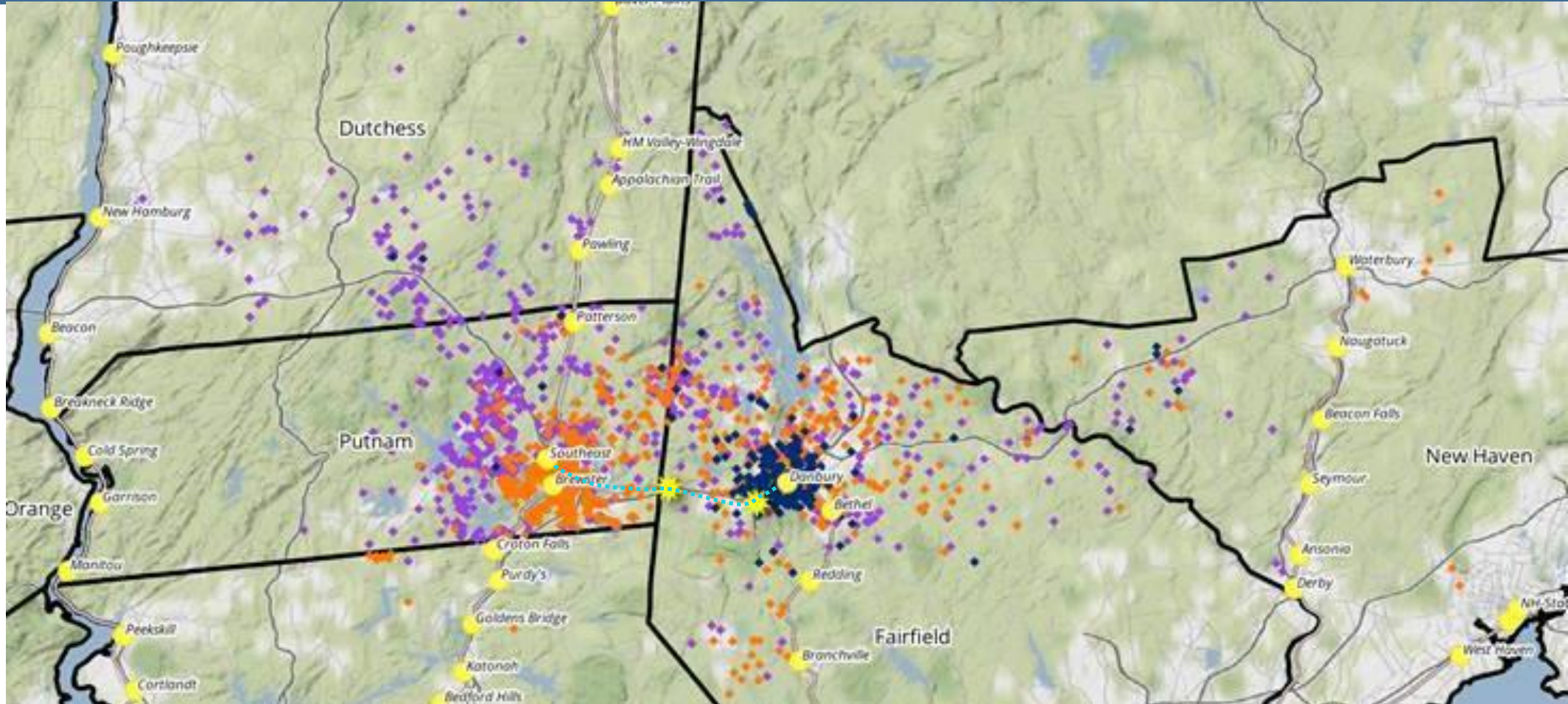
■ Manhattan ■ White Plains ■ Southeast ■ Danbury



Source: BLS



Focusing on the Metro-North 2017 rider survey



There are a significant number of Southeast (purple dots) and Brewster (orange dots) passengers travelling from within the proposed service corridor as far east as Waterbury

ALTERNATIVE	Boardings at new Danbury, Danbury Fair and State Line Stations (typical weekday to Points South)			
	Total Riders	New Riders	Changing from Drive to the Harlem Line	Decrease in Person Miles Travelled
1 Shuttle	630	270	360	-15,340
2 Peak Through	840	400	440	-24,310
3 Full Service	970	550	420	-31,700
4 Frequent Transit (LRT)	650	270	380	-15,550

- As a comparison, pre-pandemic 2019 daily ridership at MNR Danbury Station was 180 passengers; and 1,150 passengers at Southeast

- All service alternatives perform well comparatively to existing
- Projected daily person miles travelled show significant reductions for area roadway network
- Full commutation provides the largest returns
- Assuming an average fare of \$20.25:

ALTERNATIVE		Estimated Annual Revenue
1	Shuttle	\$1.7
2	Peak Through	\$2.4
3	Full Service	\$3.2
4	Frequent Transit (LRT)	\$1.7

In \$ Millions



ALTERNATIVES EVALUATION

Capital Cost Estimating: Assumptions

- Total Capital Costs are Construction Costs + Soft Costs + Contingencies
- Capital costs were developed in 2021 dollars for the recommended infrastructure, with and without electrification
 - Harlem Line Connection Alternatives BB and DD, Passing siding, intermediate stations, and Danbury Line Alternative BB
- Construction costs were developed for major categories: **Track, Stations, Train Control, Traction Power, and Special Conditions**
- Costs for Vehicles, Shops/Yards, and Employee Facilities were **excluded**.
- Summary costs for soft costs/professional services and contingency were developed primarily as percentages of total construction



- Track, Train-control, bridge systems
 - 16 bridges replaced including Croton River
- Station platforms, shelters, connecting overpass, but no parking
 - 8 car high-level platforms for commuter
 - 4 car low-level platforms for LRT
- Electrification, substations and distribution systems
 - 3rd rail assumed for EMU commuter
 - Overhead catenary assumed for LRT
- **Special conditions:** drainage, safety, and bikeway improvements

Major Construction Cost Category	Southeast Alt BB			Southeast Alt DD	
	3 rd Rail Electrified	w/o elect	LRT	3 rd Rail Electrified	w/o elect
Track	\$21.2	\$21.2	\$19.7	\$22.8	\$22.8
Stations	\$64.9	\$64.9	\$57.5	\$64.9	\$64.9
Special Site Work / Bridges	\$71.2	\$71.2	\$71.2	\$73	\$73
Environmental Mitigation	\$3.8	\$3.8	\$3.6	\$3.9	\$3.9
Train Control/Signals	\$69.4	\$69.4	\$62.7	\$69.7	\$69.7
Electrification	\$202		\$91.5	\$202.5	
Bikeway Fencing	\$2.0	\$2.0	\$2.0	\$2.3	\$2.3
Total Estimated Construction Cost (2021)	\$434.5	\$232.5	\$308.2	\$439.1	\$236.6

In \$ Millions

- Future detailed inspections expected to:
 - Lower bridge costs
 - Reduce contingencies
- For comparison:
 - MTA Projects
 - \$3.6B for LIRR Main Line 3rd Track Extension Project (9.8 miles)
 - \$2.1B for Metro-North Penn Station Access Project Design/Build contract (14.0 miles)
 - CTDOT
 - ~\$800M for New Haven – Windsor, CT Corridor Project to restore double track sections and new stations (40 miles)

Cost Category	Southeast Alt BB			Southeast Alt DD	
	3 rd Rail Electrified	w/o elect	LRT	3 rd Rail Electrified	w/o elect
Total Estimated Construction Cost	\$434.5	\$232.5	\$308.2	\$439.1	\$236.6
Total Soft Costs	\$170.7	\$ 96	\$124	\$172	\$ 97.5
Total Contingencies	\$211.8	\$115	\$151.3	\$214	\$116.9
Total Estimated Capital Cost (2021)	\$817	\$443.5	\$ 583.5	\$ 825.1	\$451

In \$ Millions

- Estimates were made for:
 - Revenue miles by service alternative
 - Number of vehicles in service for proposed operation
 - Labor was assumed to occur in three shifts
- Vehicle operations/maintenance:
 - Car miles (for EMU or LRT operations)
 - Train miles (for locomotive hauled operations)
- Right-of-way maintenance:
 - Physical configuration of alternative
 - Includes stations, security and infrastructure
- Administration cost of an alternative was developed as a percentage of all other total operating and maintenance cost

	Southeast Alt BB + Danbury BB Config				Southeast Alt DD + Danbury BB Config	
	Shuttle	Peak Through	Full	Frequent	Peak Through	Full
	Loco Hauled	Loco Hauled	EMU	Transit (LRT)	Loco Hauled	EMU
O&M Cost per new rider						
Revenue Recovery						



Worse



Better

Estimates assumed weekday operations as defined in service planning
Inflation and volatility in labor and propulsion costs not included



ALTERNATIVES EVALUATION

Operating Cost Estimating

- Operating costs developed for:
 - Train Operation and Maintenance, Propulsion, Right-of-Way, Administration
 - Cost by recommended alternative operating condition
- Unit cost assumptions:
 - Used available recent area project sources escalated to 2021
 - Incremental cost to pre-existing services
 - Est. operating costs new services only
- Total estimated operating cost is Gross, **not Net** of revenue generated

Cost Category	Southeast Alt BB + Danbury BB Config				Southeast Alt DD + Danbury BB Config	
	Shuttle	Peak Through	Full	Frequent Transit (LRT)	Peak Through	Full
	Locomotive Hauled	Locomotive Hauled	EMU		Locomotive Hauled	EMU
Vehicular Operations, Maintenance	\$1.2	\$3.7	\$5.6	\$2.7	\$4	\$5.7
Propulsion	\$0.1	\$0.3	\$0.8	\$0.2	\$0.3	\$0.9
Right-of-way Maintenance	\$1.3	\$1.3	\$1.3	\$1	\$1.3	\$1.3
Admin.	\$0.3	\$0.5	\$0.8	\$0.4	\$0.6	\$0.8
Total Est. Operating Cost (2021)	\$2.9	\$5.8	\$8.5	\$4.3	\$6.2	\$8.7

In \$ Millions



- With positive environmental determinations, a *Southeast to Danbury Rail Link Service* is operationally feasible without impeding existing Metro-North services
- Potential services could provide travel time savings by as much as 25 minutes between Danbury and NYC compared to a Danbury Line train running between the same points
- *Rail Link* would provide competitive travel times to new intermediate markets such as White Plains and for local travel on the Harlem and Wassaic lines.
- Forecasted ridership of 500-1,000 daily trips is comparable or greater than daily trips made between Wassaic and Southeast
- Projected Daily Person Miles Traveled (PMT) reductions on the area highway system of 15,000 – 32,000 PMT each day is substantive

- Anticipated Phase II
 - Will update ridership analysis based upon new regional planning projections and outcomes from the Phase I efforts
 - Will evaluate potential service extension to Brookfield Park and Ride location
- *Rail Link* service as a factor in undertaking evaluations to develop a Regional Intermodal Center at the Southeast station site incorporating expanded bus and rail operations
- Use of this feasibility study's information as the basis for more detailed and extensive environmental analysis and design of the corridor

Comments on today's webinar can be emailed to:
SE2D@AKRF.com



SOUTHEAST TO DANBURY
RAIL LINK FEASIBILITY STUDY

