SOUTHEAST TO DANBURY
RAIL LINK FEASIBILITY STUDY

Appendix A: Public Outreach

June 30, 2022

PREPARED FOR:

PUTNAM COUNTY

PREPARED BY:

wsp

AKRF

K Engineering and Land Surveying, P.C.

Responsive Translation

SOUTHEAST TO DANBURY

RAIL LINK FEASIBILTY STUDY

FREQUENTLY ASKED QUESTIONS

March 24, 2022

Collected within is a summary of the frequently asked questions posed to the Putnam County Southeast to Danbury Rail Link Project email and related answers to each.

• WHAT IS THIS PROJECT?

The project is an assessment of the regional market size and interest for rail transportation services connecting the town of Southeast in Putnam County New York to Danbury Connecticut using the former Beacon/Maybrook Line. A principal focus on improving the mobility for I-84/I-684 corridors and travel times to/from Manhattan while serving local economic centers sits at the core of the study. Additionally, the potential to connect regional markets (i.e., Danbury to White Plains) currently limited by the existing roadway network has also been shown potential benefits.

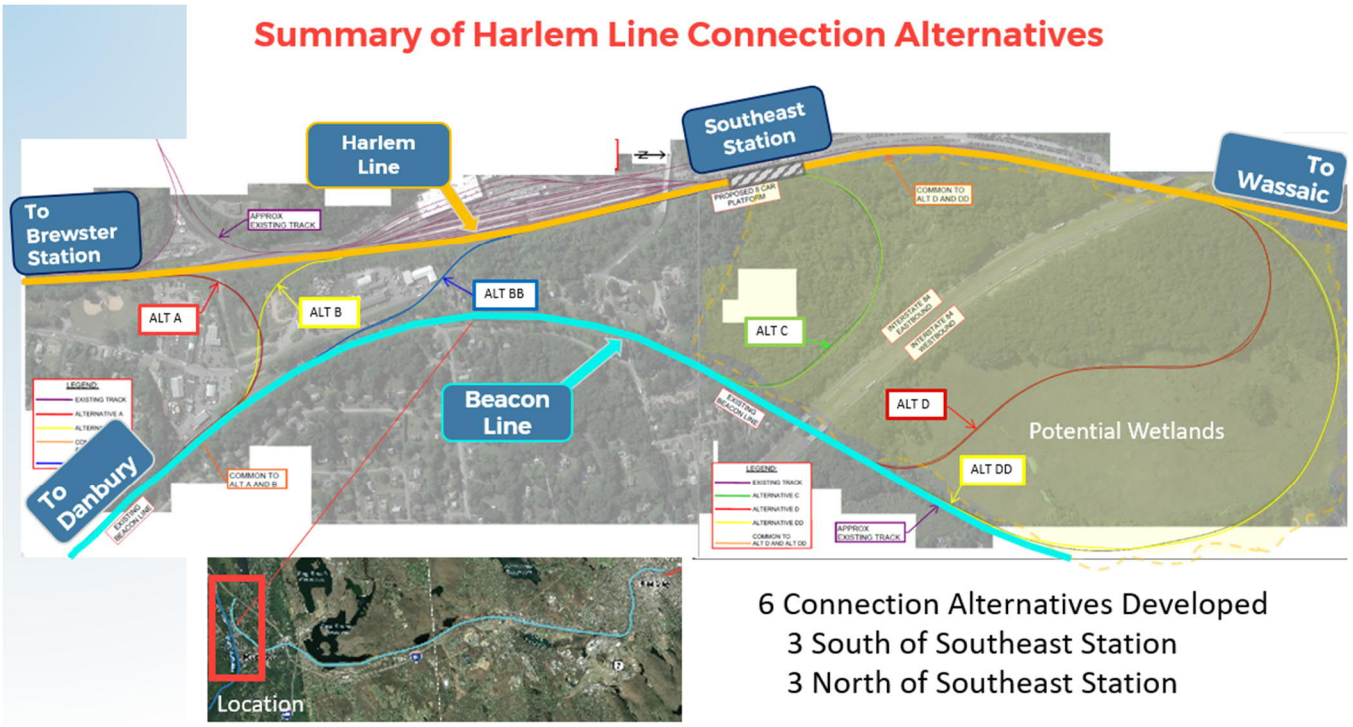
• TELL ME MORE ABOUT THE ALTERNATIVES DEVELOPMENT PROCESS...

Alternatives were developed in two distinct ways: identifying physical connections to the existing passenger rail network using the Beacon Line and by testing varied service patterns to determine travel time benefits and ridership demand.

A series of 10 different track connections (6 on the Harlem Line end, and 4 on the Danbury Branch end) were evaluated in connecting the Harlem Line and Danbury Branch. These were evaluated utilizing four service patterns (Commuter Shuttle, Peak Direct, Full through, and Light Rail Transit) with varying types of equipment operating each of those services.

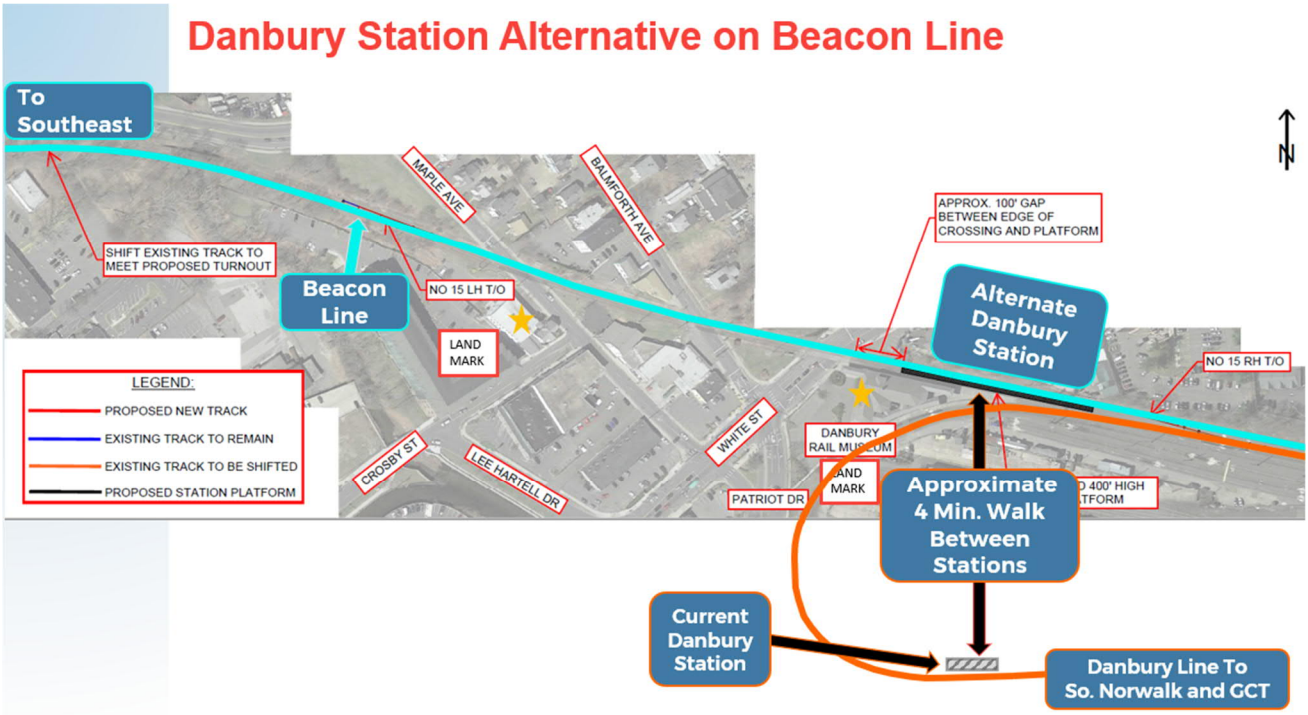
Special consideration was given to corridor space for additional track work (passing sidings, switches, electrification signaling), the proximity of the Maybrook Bikeway, the environmental sensitivity of the corridor, the existing train operations of Metro-North and the Housatonic Railroads, and the potential for new stations along the corridor.

On the Harlem Line side of the corridor, the connections were developed as follows:



With connection alternatives BB (independent stub end connection) and DD (high-speed connection loop) being preferred for their flexibility and operating characteristics.

On the Danbury Branch side of the corridor, it became readily apparent that connecting to the existing Danbury station would create far too many community impacts (taking up street-right-of way, additional grade crossings, impacting the Still River, or historic properties). Instead an alternative focusing on the former Station is proposed:



Each of these connection alternatives are suitable for the various service types mentioned, and were envisioned as having two new intermediate stations: in the vicinity of Danbury Fair and the I-84 Park and Ride in the vicinity of Farrington's Woods.

• DID YOU CONSIDER DEVELOPING AN ALTERNATIVE THAT CONNECTS POINTS FURTHER EAST THAN DANBURY?

Connecting Southeast to Danbury was the focus of this study. Further expansion eastward hasn't been fully evaluated in this project, however, the Danbury station concept was specifically developed to readily permit a future eastward extension if it is determined to advance such an initiative. Depending on the frequency of service, construction of additional passing sidings and other railway infrastructure along the Beacon Line could be necessary.

• HOW DOES THIS INTERACT WITH THE BIKE TRAIL? WOULD CONSTRUCTION IMPACT THE TRAIL?

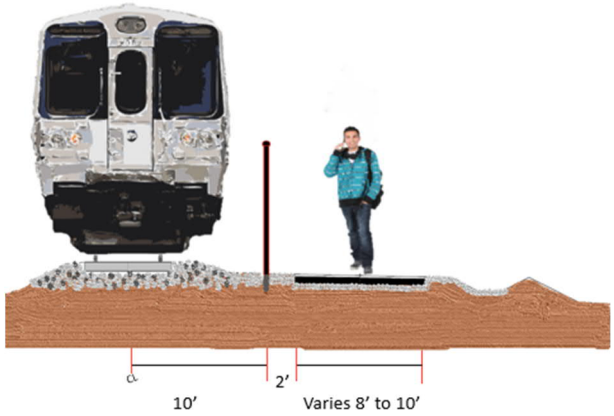
All proposed trackwork will need to work with the Maybrook Bike Trail already in existence, and the section being constructed in the vicinity of Farrington Woods, which also has potential for a station, co-located with the existing park and ride lot there.

There are over 300 trails alongside active rails, according to the USDOT Federal Highways Administration. The FHWA's 2021 Rails with Trails Manual suggests that some of the best practices for safety of trails along active rails include:

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

As part of our alternatives development we have included suitable fencing separation the length of adjacent trail (typical section shown below)

Typical Maybrook Bikeway Section



For the places where the Trail needs to cross the railroad, a ramped overpass has been developed to carry trail users comfortably over the railroad without interruption. If the project is constructed, all protective measures will need to be in place prior to railroad construction. The expectation would be that the needed overpasses and fencing would be constructed first, to minimize any temporary closure of the trail.

• WHAT IS THE EXPECTED RIDERSHIP FOR THE PROPOSED PROJECT?

Ridership estimates for the project vary by the service pattern offered as follows:

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

Forecasts were made using the FTA STOPS model for the NYMTC service area, and calibrated to Metro-North Ridership survey data.

As a point of comparison, existing daily ridership at Southeast station is 1,150 and 180 at Danbury. The forecast ridership is comparable or greater than the ridership for the Wassaic extension service of the Harlem Line.

• WHAT IS THE EXPECTED TRAVEL TIME TO MANHATTAN?

Depending on the service type, a rider can expect a travel time of 104 – 111 minutes (through service versus connecting shuttle service) to travel from Danbury to Grand Central Terminal. This would provide up to an 18-minute savings as compared to existing services on the Danbury Line.

• HOW MUCH WILL IT COST?

Depending on configuration, electrification, and service type, the cost of developing the project has been estimated at $450M to $825M. This is comparable to recent MTA projects ($2.6B for LIRR Expansion, $2.1B for Penn Station Access).

• HOW LONG WILL IT TAKE TO CONSTRUCT?

There are a number of steps the project must undertake prior to entering construction. To be eligible for federal funding, the project must undertake a likely National Environmental Policy Act Environmental Assessment, and development of preliminary engineering designs first. That effort typically takes approximately a year to complete. From there, assuming there are no significant impacts, final design can occur, which is roughly another year. Procurement of materials and construction for a corridor of similar length can take from 2 to 3 years. All told a minimum of 4 to 5 years could be expected, however delays could occur at every step of development.

• ISN'T METRO-NORTH RAILROAD ABANDONING THE BEACON LINE? DOESN'T THAT PRECLUDE THIS EFFORT?

While Metro-North has petitioned the Surface Transportation Board to abandon the Beacon Line within the State of New York, this is primarily due to its desire to stop maintenance expenditures on a line used only to ferry equipment or by work crews where alternate routing is preferred. Metro-North has also never operated passenger service on the line. The proposed Rail link project alternatives seek to make use of a portion of the corridor south of the existing Beacon/Harlem Line connection, to improve I-84 corridor area commutation. The abandonment of the remainder of the line does not preclude the Rail link project from advancing.

• ISN'T THE DANBURY LINE BEING UPGRADED? DOESN'T THAT NEGATE THIS EFFORT?

It is believed the improved signals on the Danbury branch does not make the project redundant, as the routes have different intermediate markets. With the right infrastructure investments, a Danbury Beacon Line service could provide shorter travel times to NYC. Preliminary estimates indicate travel times would remain shorter even if the State of Connecticut funds the re-electrification of the Danbury Line as is currently being considered. Also, the New Haven Line is capacity constrained, limiting adding additional trains to the Danbury Line and ultimately to points further south. The service proposed by this study is an extension of existing train service that currently terminates at Southeast, meaning there are already spaces for these trains within the existing services further south.

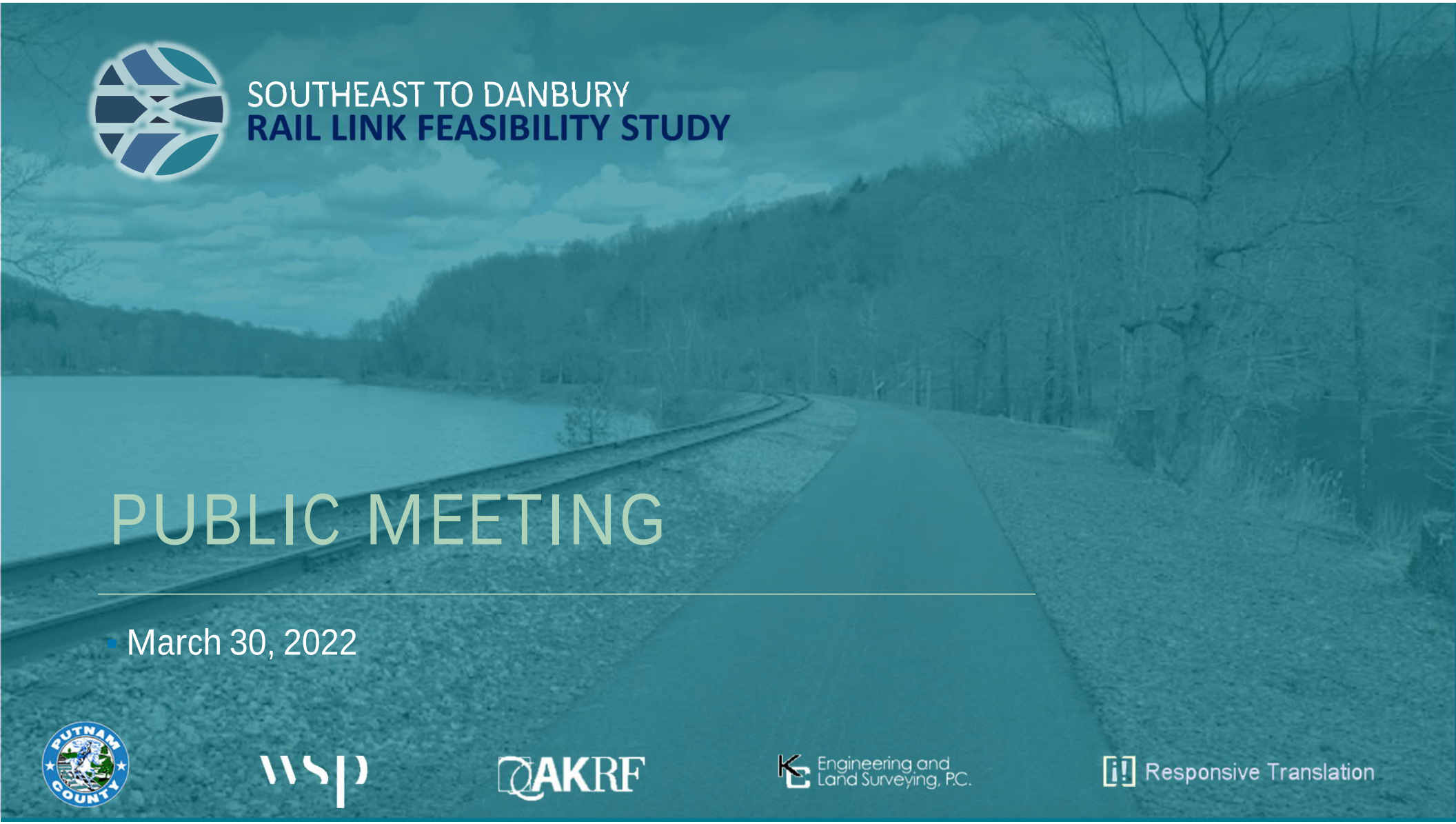
• WHY DON'T YOU SIMPLY BUILD A PARKING DECK OR PROVIDE ADDITIONAL BUSES?

A number of comments suggested building a parking deck at Southeast Station or that study should consider a shuttle option using existing streets as a lower-cost option to rail development. While the capital costs for either of these suggestions would be less compared to rail, neither of the concepts addresses area's serious roadway congestion and lengthy travel times. The parking deck option would not provide

connections with intermediate stations and preclude local travel opportunities. The road shuttle would be vulnerable to delays from the above highway congestion and not achieve competitive travel times.

• WILL THERE BE FURTHER OPPORTUNITIES TO GET INVOLVED?

In the coming environmental review and preliminary engineering phase, there will be a large community outreach effort undertaken to solicit input into the project's planning and development. That effort will be defined with project stakeholders prior to initiation of the next project phase.



SOUTHEAST TO DANBURY
RAIL LINK FEASIBILITY STUDY

PUBLIC MEETING

- March 30, 2022

PUTNAM COUNTY

WSP

AKRF

Engineering and Land Surveying, P.C.

Responsive Translation

SESSION INFORMATION

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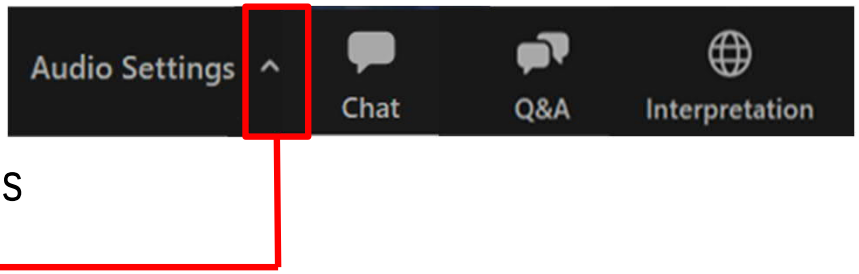

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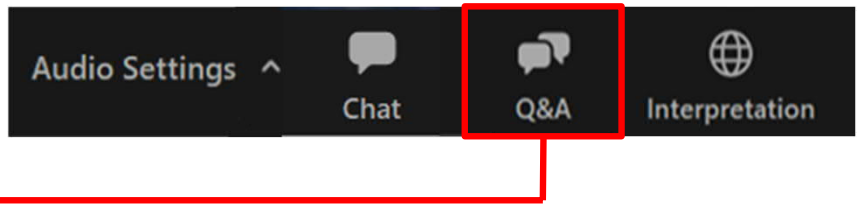

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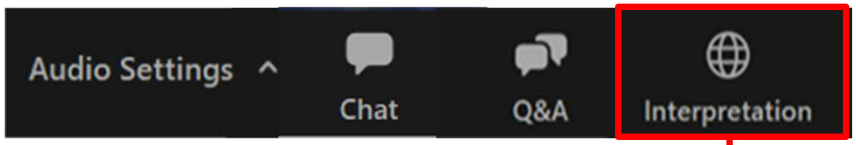

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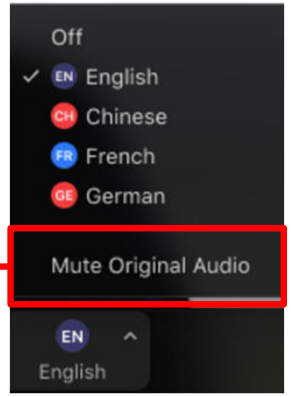

SESSION INFORMATION

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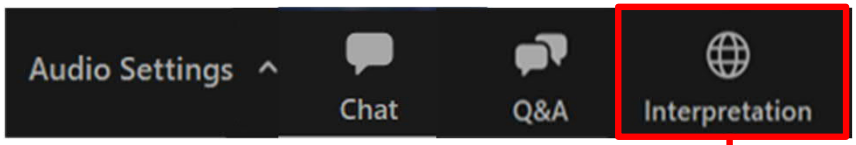

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SESSION INFORMATION

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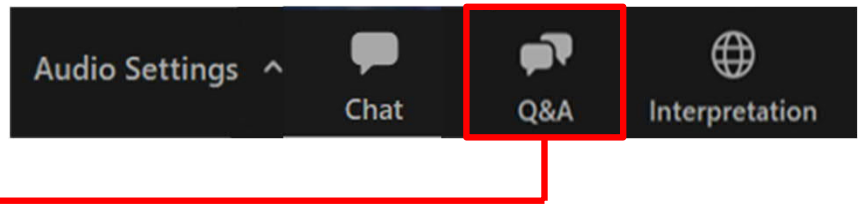


SESSION INFORMATION

Today's Speakers:

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

Panelists:

James Anderson, WSP Deputy Project Manager
Martin Hull, WSP Planning Lead – Service Planning
Nicole Weymouth, WSP Environmental Lead – Land Use and Environment
Chris Papazoglou, WSP Engineering Lead – Alternatives Development
Anthony Gioco, WSP Engineering – Track Design
Rick Curry, WSP Forecasting Lead – Ridership
Nina Peek, AKRF Public Outreach Lead
Steven Gates, AKRF Public Outreach - Socioeconomics

AGENDA

SE2D

- Study Background
- Existing Corridor Conditions
- Alternatives Development
- Alternatives Evaluation
- Summary

STUDY BACKGROUND

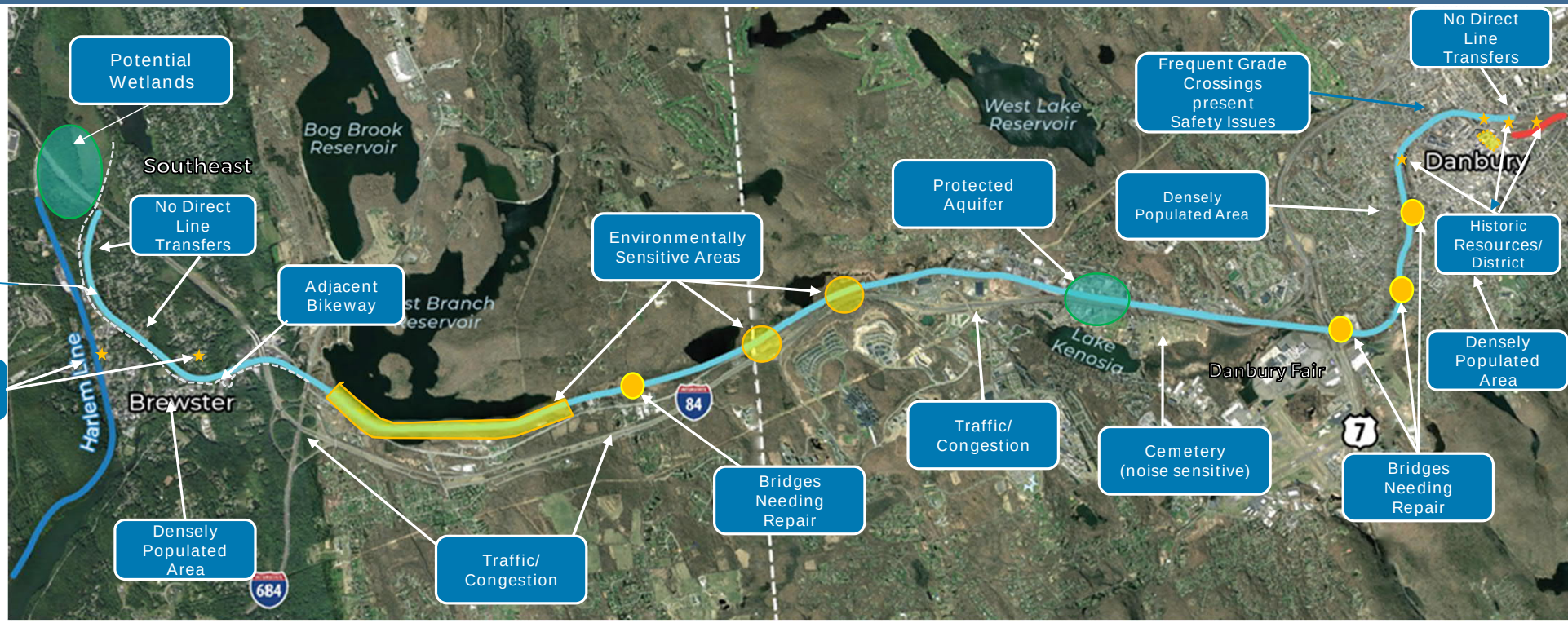
- NYMTC supported assessment of the regional market and interest for rail services connecting Southeast to Danbury
- Evaluate the feasibility for passenger rail service connecting Southeast to Danbury
  - Potential extension of Metro-North's Harlem Line to the Danbury Line or further northeast
  - Stand-alone service alternatives with coordinated transfers
- Improve 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, tourist attractions and housing


Over the Croton River


At Southeast Station


At the former NHRR Station now Museum

EXISTING CORRIDOR CONDITIONS



Beacon Line Harlem Line Danbury Line

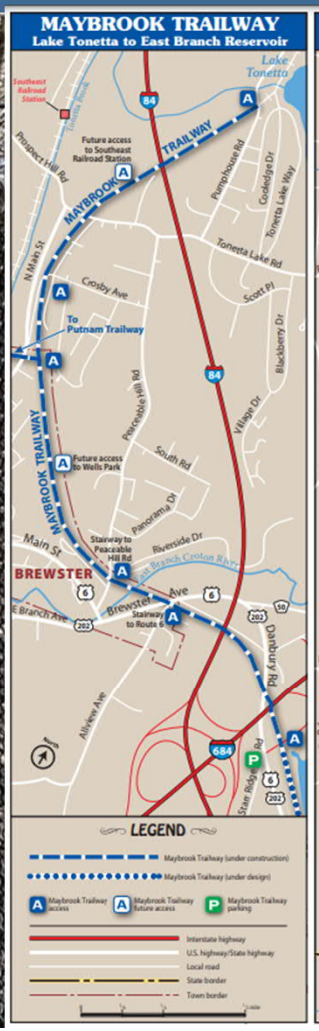
While there are current connections further away, trains would need to make directional changes to transfer between lines, slowing operations significantly

EXISTING CORRIDOR CONDITIONS

Adjacent Bikeway

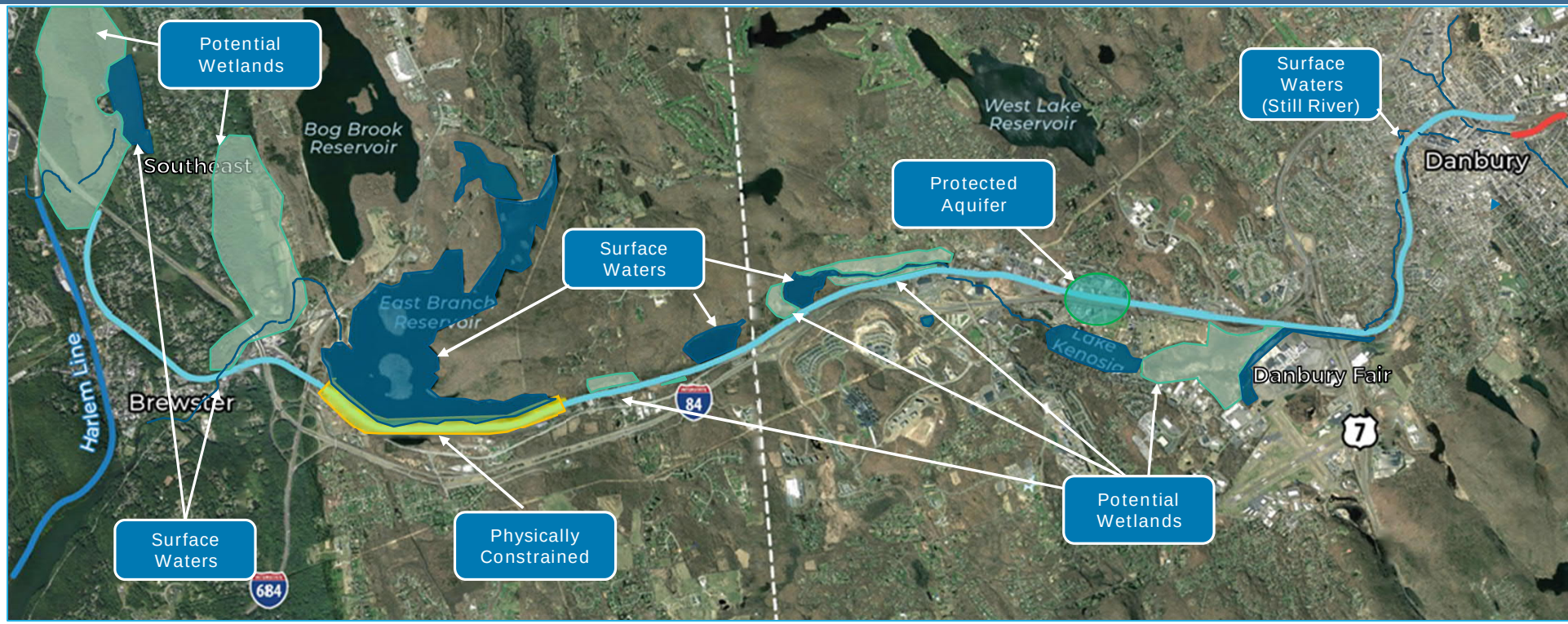
Special consideration of the Maybrook Bikeway and others that traverse the same corridor was made in developing designs

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



EXISTING CORRIDOR CONDITIONS

Environmental Conditions



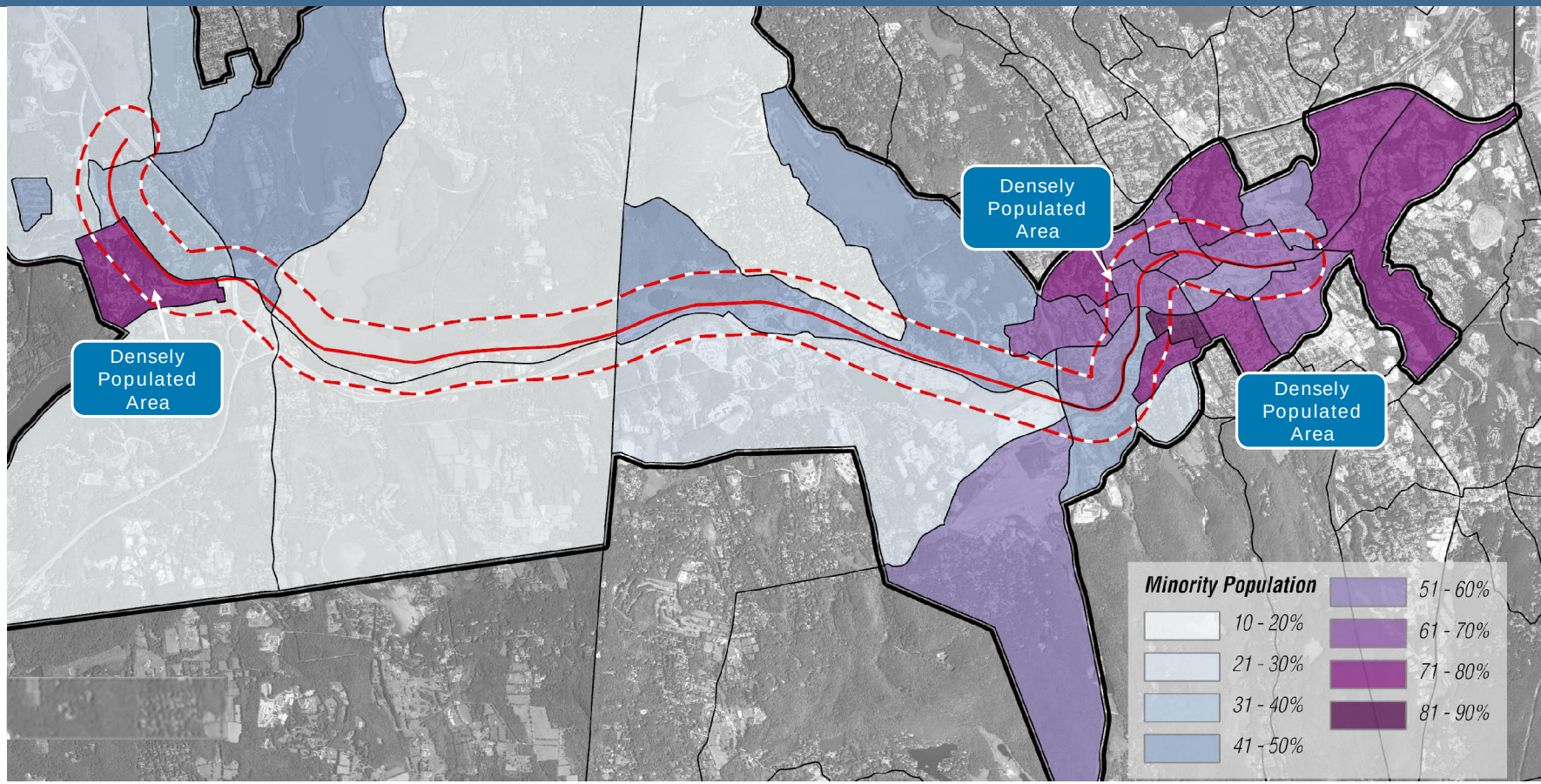
Beacon Line Harlem Line Danbury Line

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

EXISTING CORRIDOR CONDITIONS

Population Characteristics

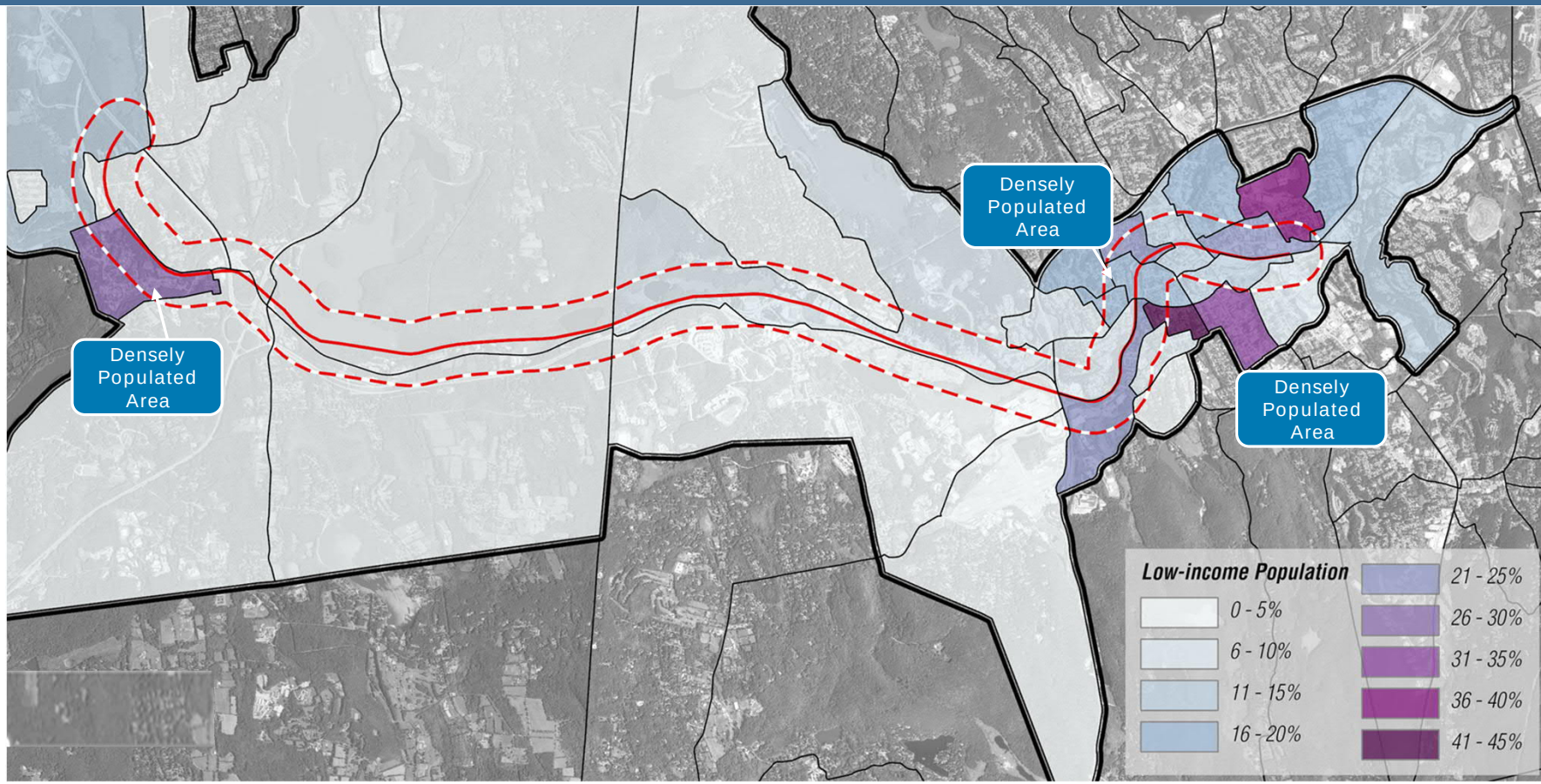
A diverse population throughout the corridor…



EXISTING CORRIDOR CONDITIONS

Population Characteristics

And a broad range of incomes



EXISTING CORRIDOR CONDITIONS

Summary

- Trailway will require special consideration in alternatives development
- Many locations where the railroad is directly adjacent to 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)

ALTERNATIVES DEVELOPMENT

Station Opportunities

Beacon Line Harlem Line Danbury Line

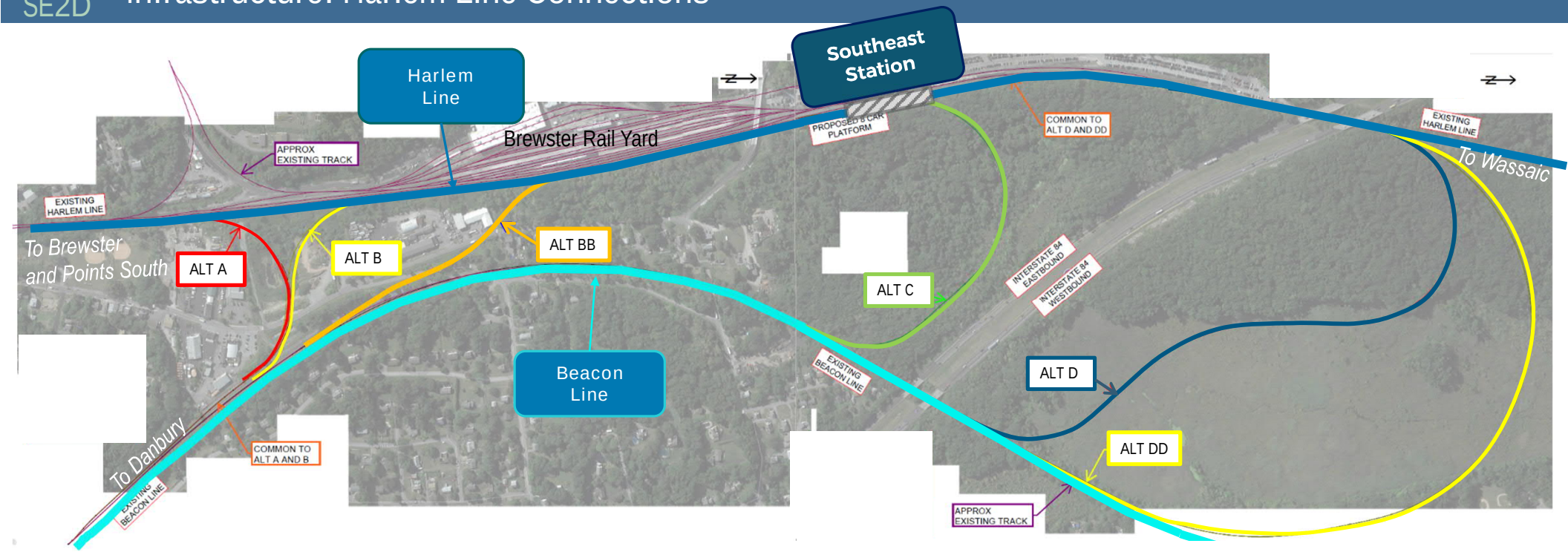
ALTERNATIVES DEVELOPMENT

Infrastructure – Rail Line Connections

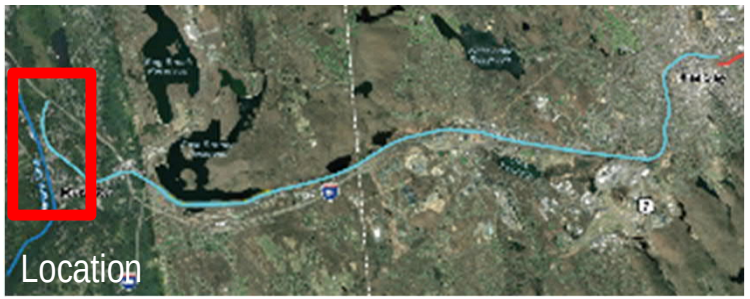
- Infrastructure options to link the Beacon Line with existing rail routes
  - Current track alignment does not provide useful connections to the Harlem Line and Danbury Line
  - Series of 10 different main track and station connections were developed for linking the two Metro-North lines
- All concepts 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

ALTERNATIVES DEVELOPMENT

Infrastructure: Harlem Line Connections

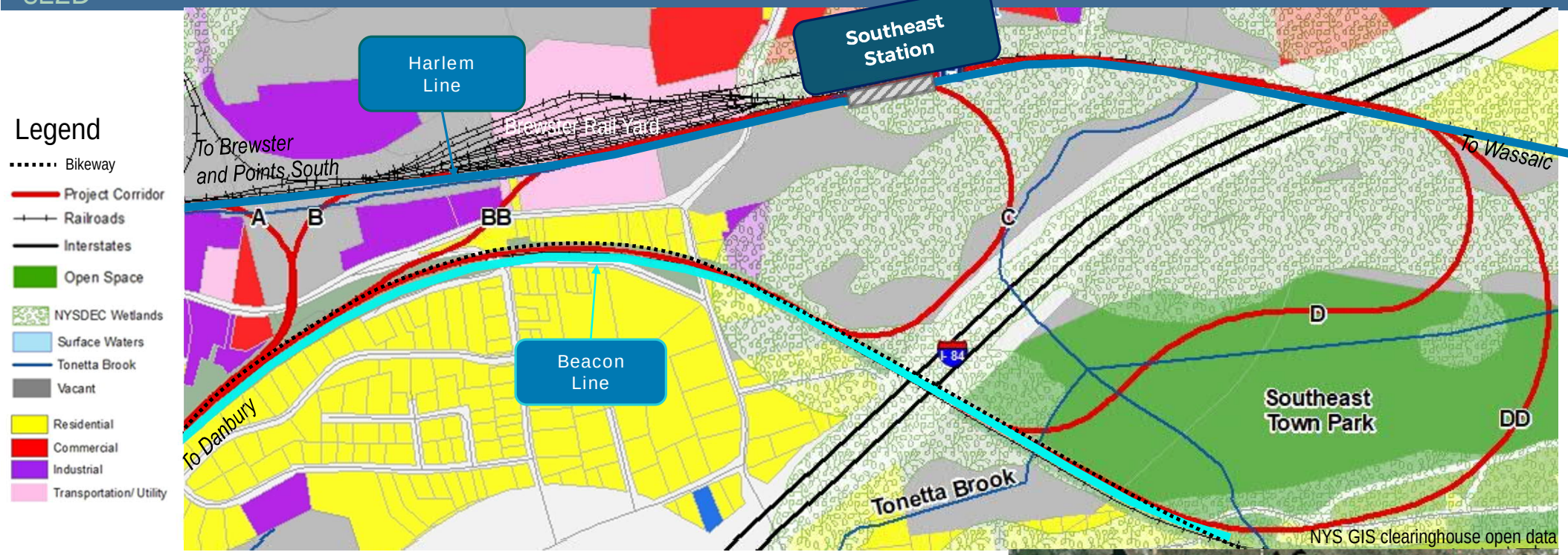


- 6 Connection Alternatives Developed
  - 3 South of Southeast Station
  - 3 North of Southeast Station
- Alternatives BB/DD offer the greatest flexibility

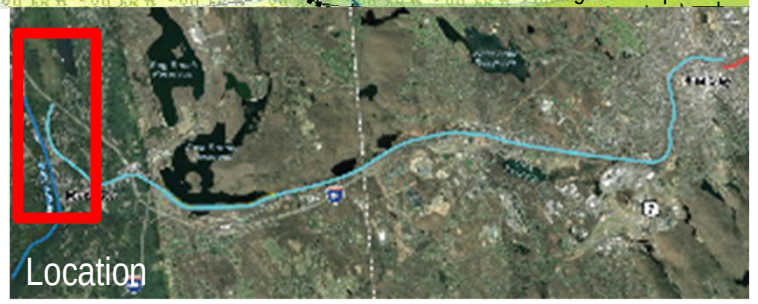


ALTERNATIVES DEVELOPMENT

Harlem Line Connections: Land Use Impacts



- 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

Harlem Line Connections: Considerations

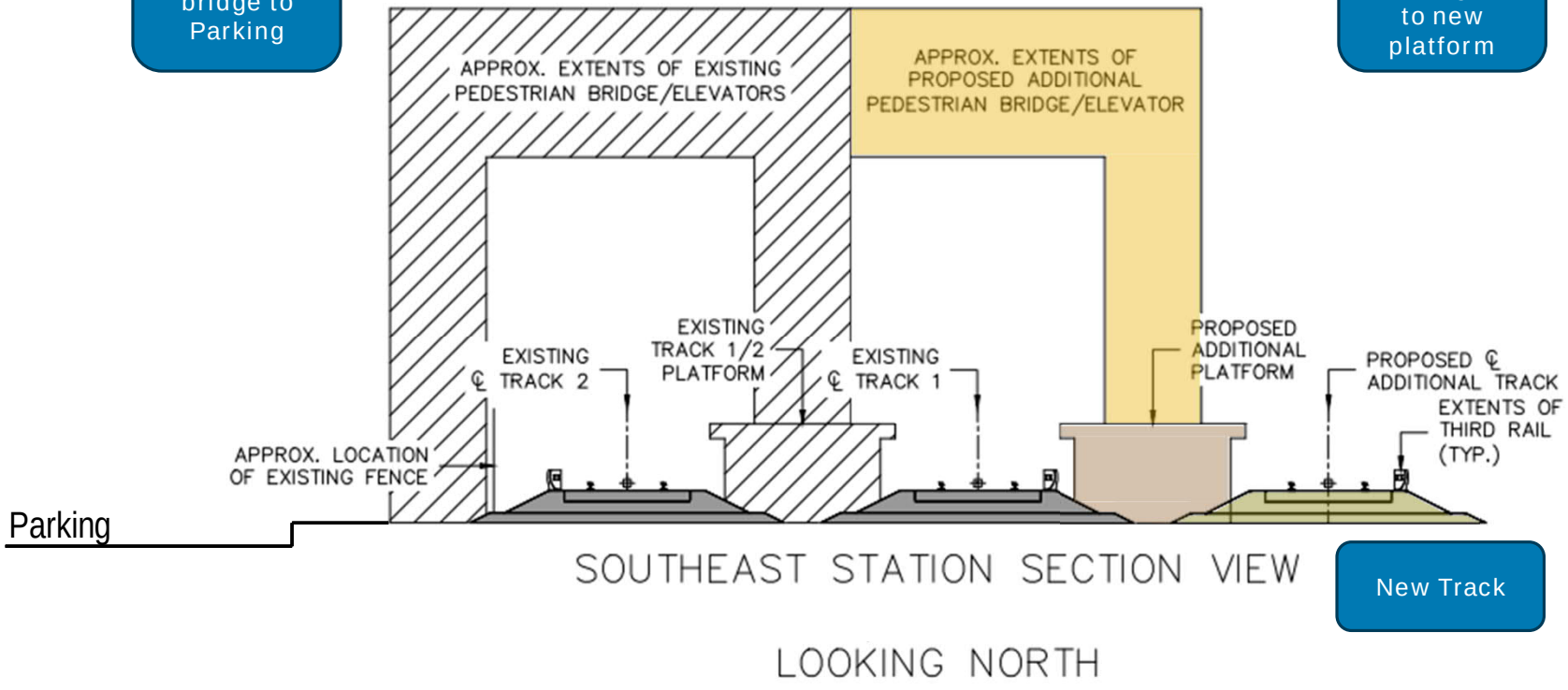
- Alternative A does not serve Southeast Station and has major community impacts
- Alternatives B/BB require operational “turn” at Southeast Station - require an additional platform edge and station track
- Alternative C would indirectly serve Southeast Station due to track geometry – may not be feasible to construct an ADA compliant platform
- Alternatives C, D, DD have improved operations and travel times - increased potential wetlands/parks impacts
- Additional station platform edge and track at Southeast Station is recommended for all alternatives to avoid interference with Harlem Line operations

ALTERNATIVES DEVELOPMENT

Harlem Line Connections: Southeast Station Concept

Existing pedestrian bridge to Parking

Extended pedestrian bridge to new platform



New Track

ALTERNATIVES DEVELOPMENT

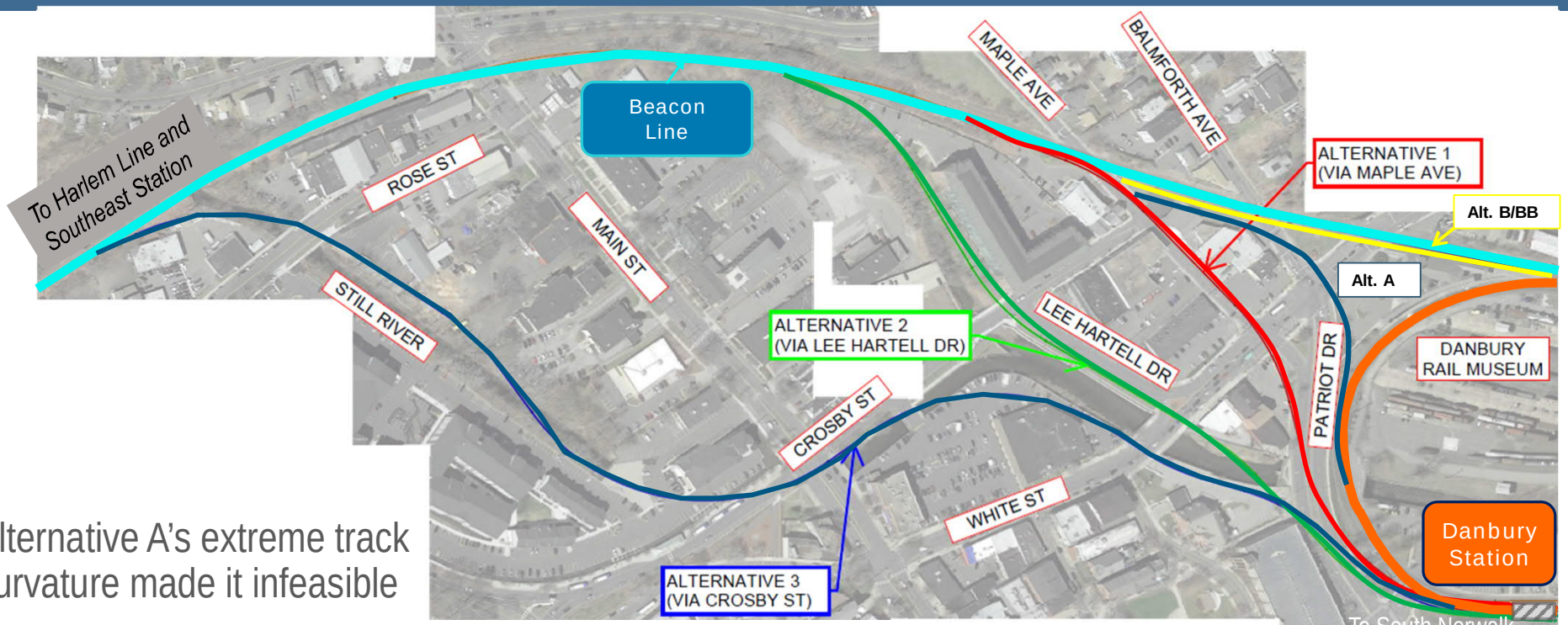
Infrastructure: Danbury Line Connections

- 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 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

ALTERNATIVES DEVELOPMENT

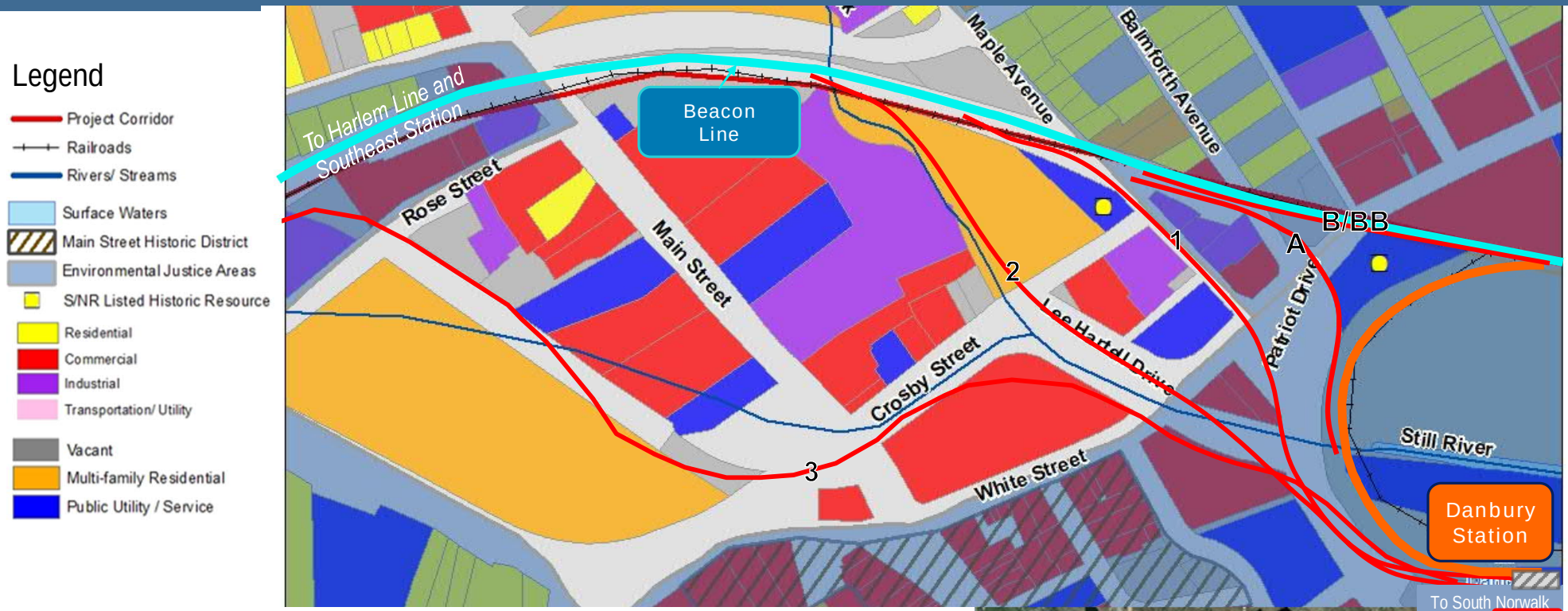
Infrastructure: Danbury Line Connections



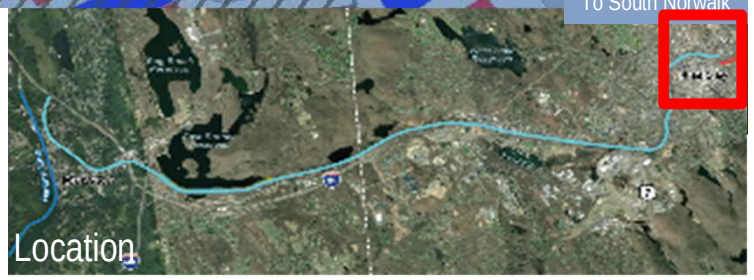
- Alternative A's extreme track curvature made it infeasible
- Alternatives 1, 2, and 3 require multiple new road crossings
- Alternative 1 was initially developed as a street running option
- Alternatives B/BB offer the least impacts and greater flexibility

ALTERNATIVES DEVELOPMENT

Danbury Line Connections: Land Use Impacts



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



ALTERNATIVES DEVELOPMENT

Danbury Line Connections: Considerations

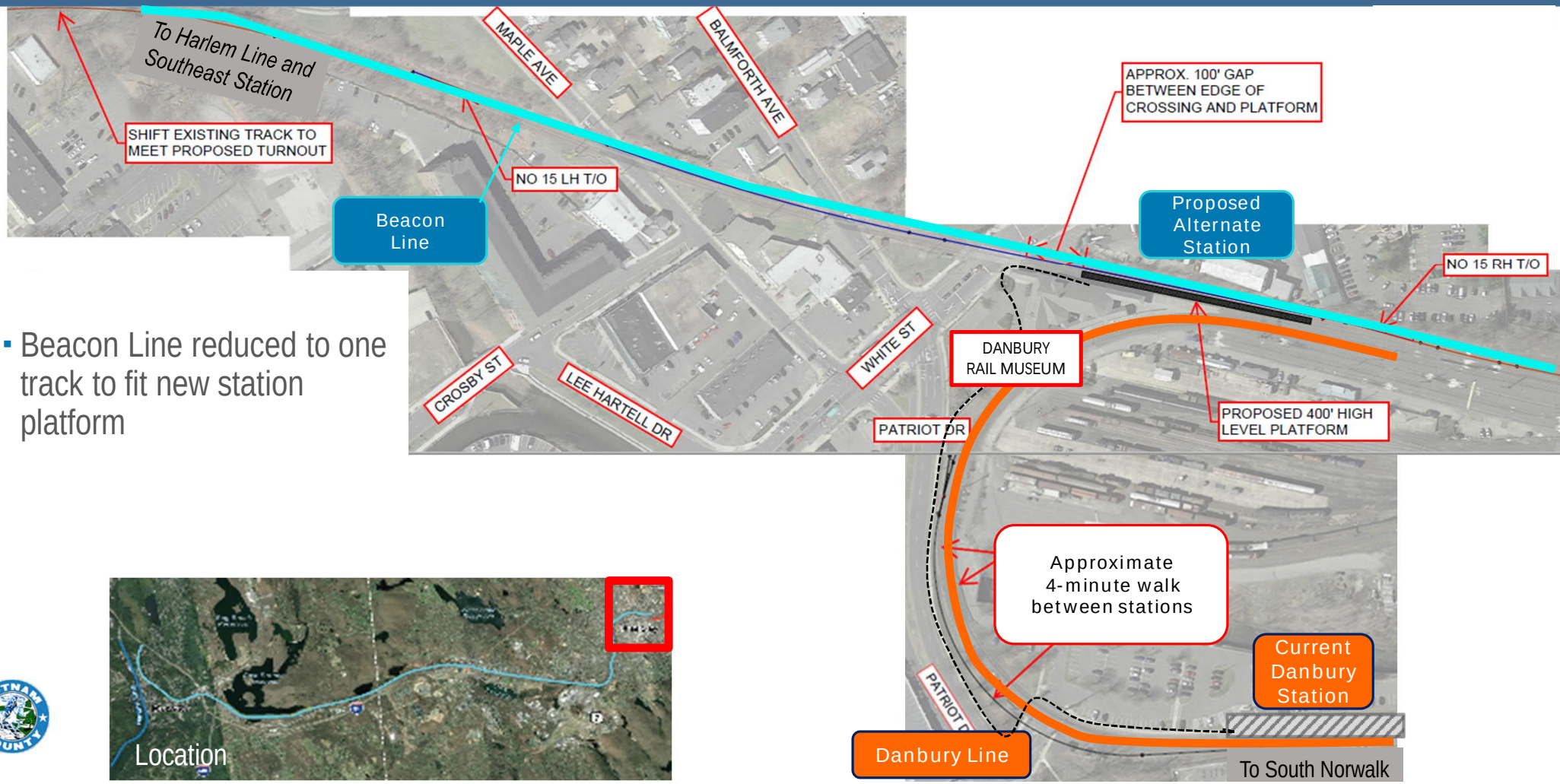
- All Alternatives with direct connections to current Danbury Line station considered infeasible
  - All require additional grade crossings (some with occupancy in the center of the street) and have large downtown impacts to commercial and residential structures
  - All have additional impacts to the Still River and other streams
  - All require very slow operations due to track geometry and/or safety considerations

- Alternatives connecting the Museum Station site considered feasible
  - Stay within existing Beacon Line right-of-way
  - Do not require additional grade crossings
  - Can accommodate a new high-level platform and avoid impacts to existing Museum building (Alt BB only)
  - Can provide safe pedestrian connection between two stations

ALTERNATIVES DEVELOPMENT

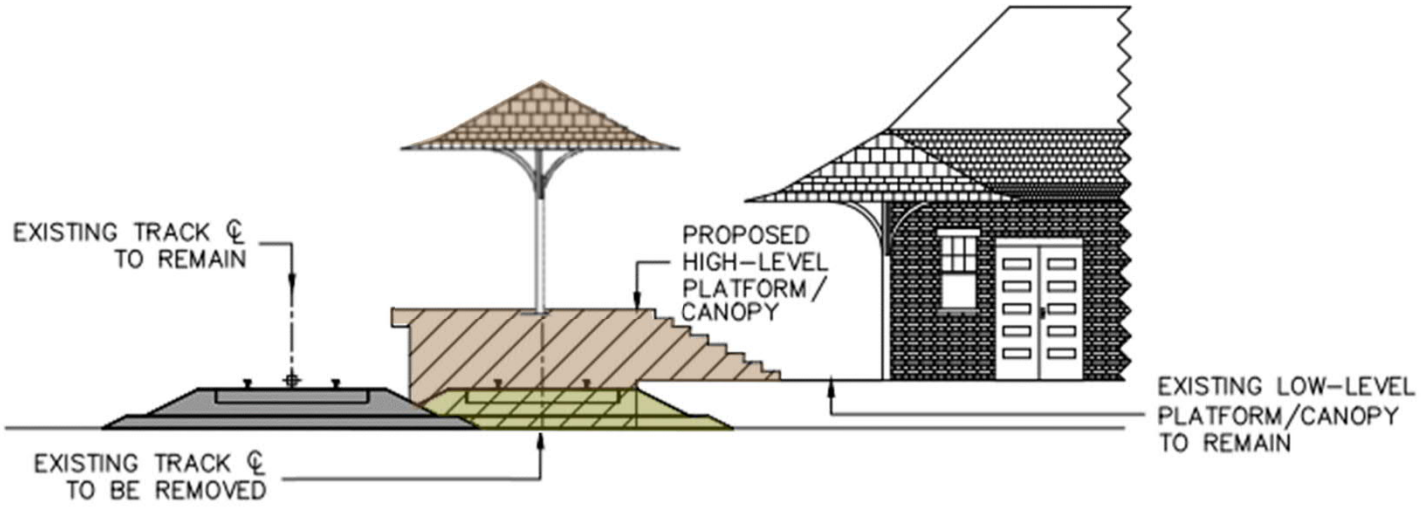
Infrastructure: Danbury Line Museum Station Connections

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



ALTERNATIVES DEVELOPMENT

Danbury Line Connections: Danbury Station Concept



DANBURY MUSEUM/STATION SECTION VIEW

LOOKING EAST

ALTERNATIVES DEVELOPMENT

Corridor Upgrades

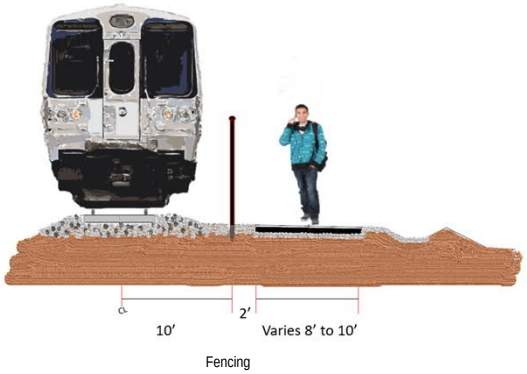
Beacon Line Harlem Line Danbury Branch Existing Double Track Territory

ALTERNATIVES DEVELOPMENT

Corridor Upgrades: Safety and Security

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

Typical Maybrook Bikeway Section



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

ALTERNATIVES DEVELOPMENT

Rails with Trails

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

Wassaic Rail Trail courtesy of N.Peek

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


Schuykill River Trail in Conshocken, PA (Googlemaps)


A Line Train in Denton TX. (Googlemaps)

ALTERNATIVES DEVELOPMENT

Recommended Infrastructure

- At Southeast Station, Alternative BB – Transfer or Alternative DD -Through. Alternative DD provides the shortest travel times between Danbury and GCT
- New intermediate stations at “State Line” and “Danbury Fair” or “Mill Plain Road TOD”
  - Peaceable Hill Rd. station for shuttle alternative
- Complete reconstruction of Beacon Line track, signal, bridge, crossing and safety systems
- New passing siding at State Line, extension of double track from Danbury westward to Danbury Fair or Mill Plain Rd.
  - Second passing siding at Peaceable Hill Rd with shuttle alternative
- At Danbury, Alternative BB should be included to limit area roadway and historic station impacts

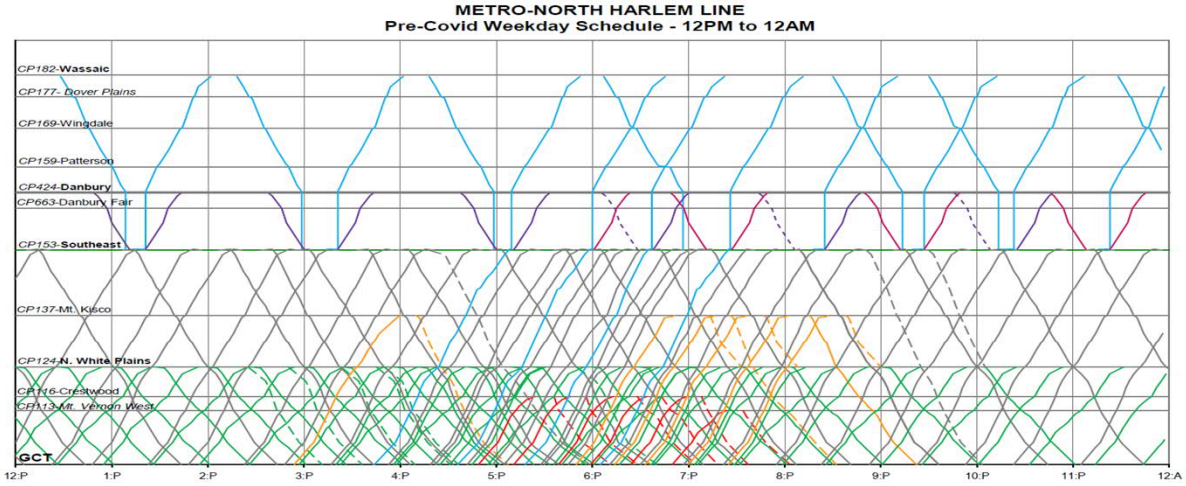
ALTERNATIVES DEVELOPMENT

Service Planning

- 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, 3rd Rail electrification	No	Presence of 3rd 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

	Existing Conditions	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Build - Danbury Branch	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 DEVELOPMENT

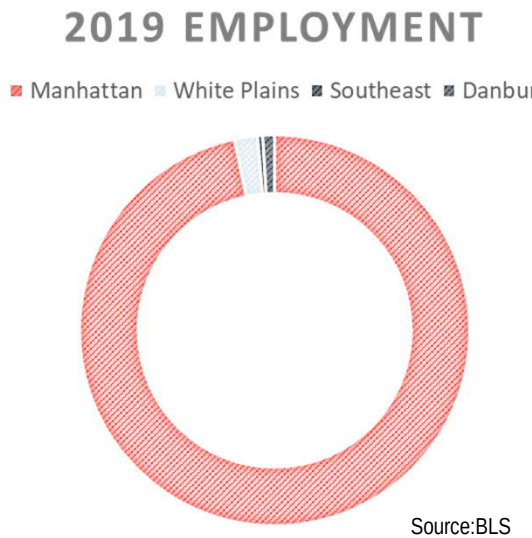
Service Planning: Considerations

- All service alternatives travel time improve over current (pre-pandemic) service levels on the Danbury Line
- Integration with existing Harlem Line services required – transfers at Southeast, Peak Period slots
- Shuttle service or through service that reverses direction at Southeast requires less additional infrastructure (Best suited to Harlem Line Alt BB)
- Faster, direct through service requires more additional infrastructure to permit continuous direction operation (Best suited to Harlem Line Alt DD)

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

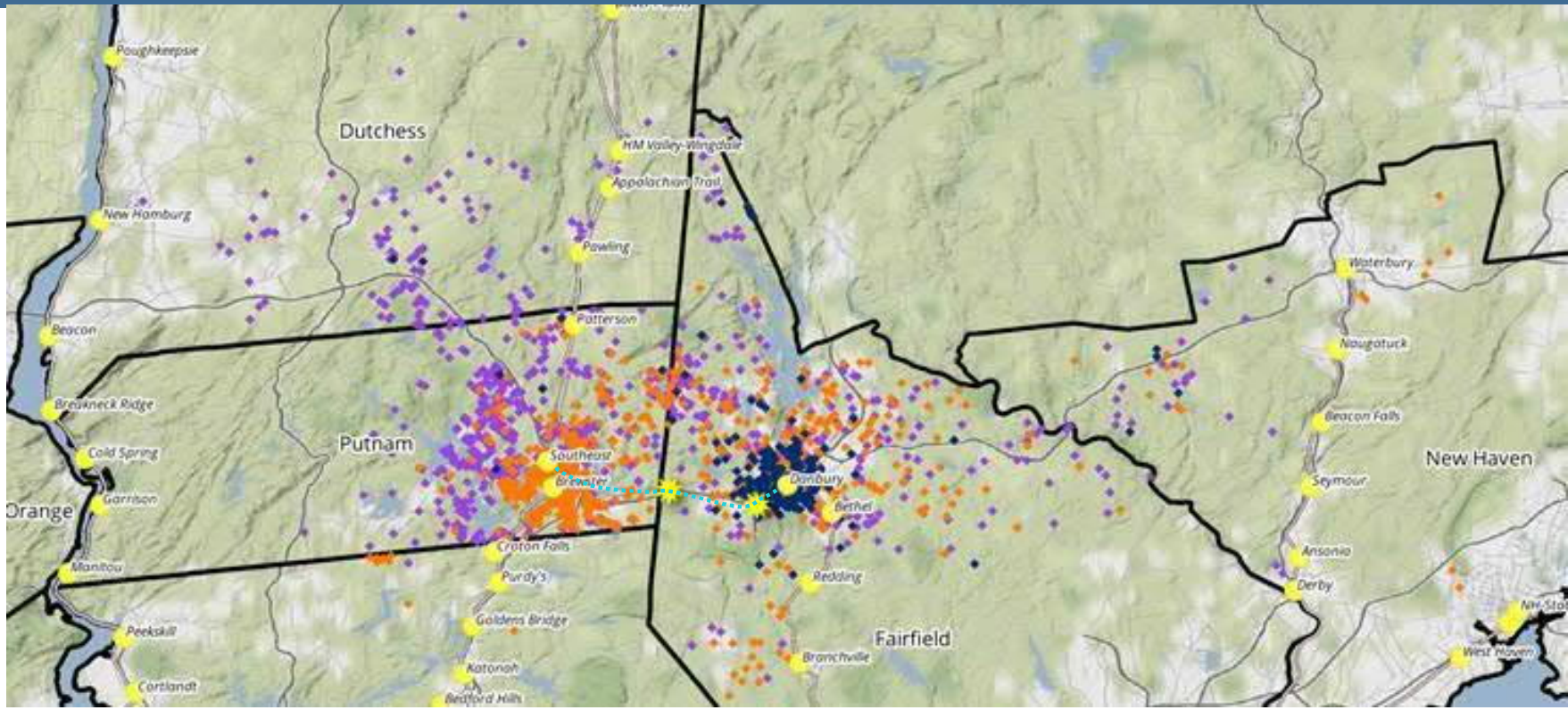


Source:BLS

ALTERNATIVES EVALUATION

Ridership Forecasting: Metro-North Station Boardings by Origin Location (2017 MNR Survey)

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

ALTERNATIVES EVALUATION

Ridership Forecasting

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

ALTERNATIVES EVALUATION

Ridership Forecasting: Considerations

- 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

ALTERNATIVES EVALUATION

Capital Cost Estimating: Construction Cost

- 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	
	3rd Rail Electrified	w/o elect	LRT	3rd 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

ALTERNATIVES EVALUATION

Capital Cost Estimating: Soft Cost & Contingency Assumptions

Soft Costs include:

	As based on:	
— Engineering & Construction Support	12%	Of Total Estimated Construction Cost
— Project Management (Design & Construction)	3%	
— Construction Management, Inspection	10%	
— MNR/MTA Engineering And Administration	5%	
— Legal, Permits, Review Fees	2%	
— Insurance	5%	
— Service Start-up/Commissioning	Lump sum	

Contingencies included:

— Allocated Contingency for design development	25%	Of Total Estimated Construction Cost + Soft Costs
— Unallocated Contingency for Construction Phase and Reserve	10%	

ALTERNATIVES EVALUATION

Capital Cost Estimating

- 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	
	3rd Rail Electrified	w/o elect	LRT	3rd 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

ALTERNATIVES EVALUATION

Operating Cost Estimating: Assumptions

- 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 Transit (LRT)	Peak Through	Full
	Loco Hauled	Loco Hauled	EMU		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

ALTERNATIVES EVALUATION

Potential Project Funding and Financing

- Bipartisan Infrastructure Law (BIL) - $108B for transit and $102B for rail
- Key Federal Capital Funding Programs
  - USDOT – National Infrastructure Project Assistance - $15B over five years including BIL (RAISE, INFRA)
  - FRA – Consolidated Rail Infrastructure and Safety Improvements - $1B per year including BIL (CRISI)
  - FTA – Section 5309 Fixed Guideway Capital Improvement Grants - $20B over five years including BIL (Starts)
  - FHWA – Congestion Mitigation and Air Quality - $13B over five years including BIL (CMAQ)
- State Capital Funding Programs
- Start-Up Financing Programs
- Public Private Partnerships
- Operating and Maintenance Funding

SUMMARY

SE2D

- 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
- 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

Comments on today's webinar can be emailed to:

SE2D@AKRF.com

SOUTHEAST TO DANBURY
RAIL LINK FEASIBILITY STUDY

PUTNAM COUNTY

WSP

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Engineering and Land Surveying, P.C.

Responsive Translation

Putnam County Southeast to Danbury Rail Link Feasibility Study

December 6, 2021

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Putnam County Southeast to Danbury Rail Link Feasibility Study

December 6, 2021

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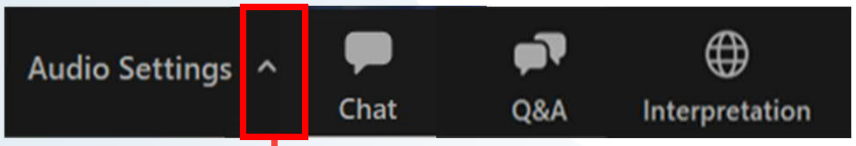

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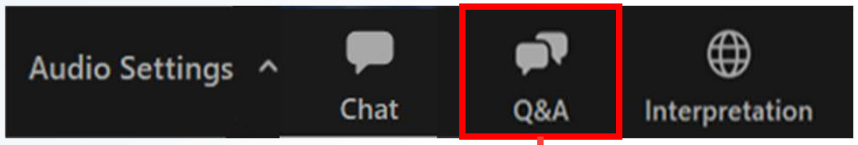

Putnam County Southeast to Danbury Rail Link Feasibility Study

December 6, 2021

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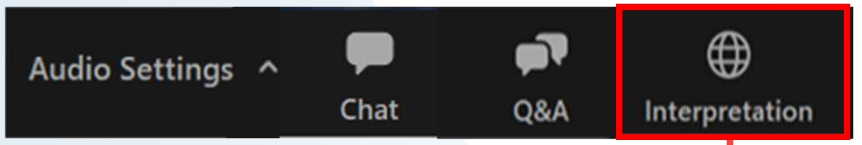

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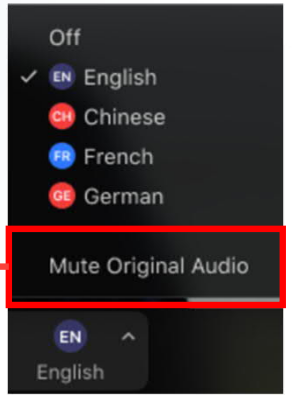

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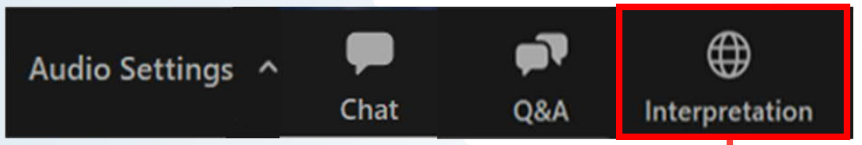

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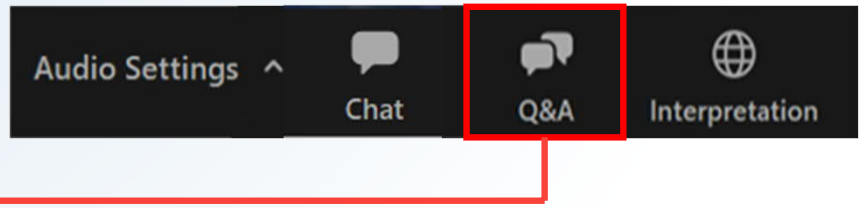


Southeast to Danbury Rail Link

- Introductions
- Study Purpose
- What We've found
- What We've developed
- Next Steps.


Over the Croton River

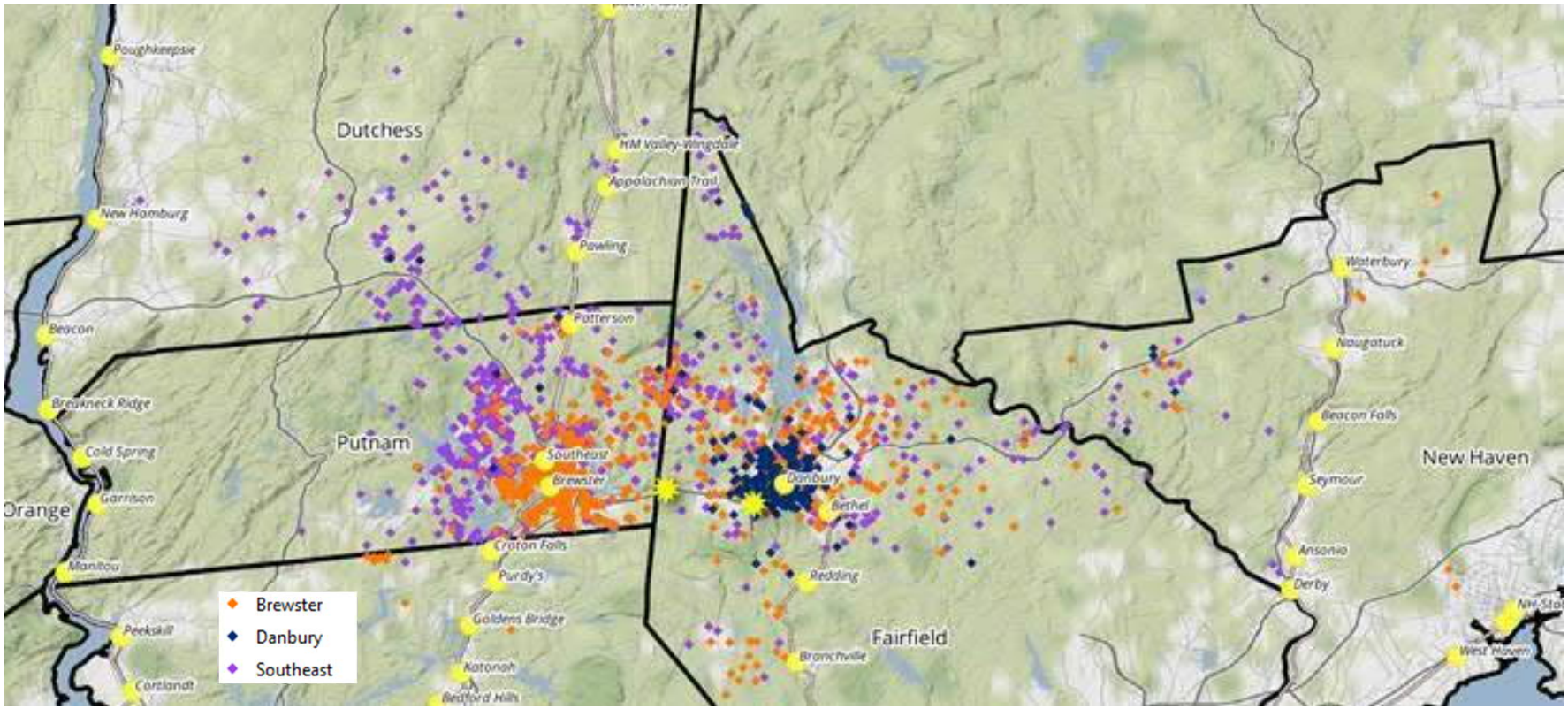

At Southeast


At the Former NHRR Station now Museum

Study Purpose

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

Existing Station Boardings by Origin Location (2017 MNR Survey)



- MNR's Survey shows there are a significant number of Southeast (purple dots) and Brewster (orange dots) station using passengers travelling from within the proposed service corridor as far east as Waterbury

What We Found


Along East Branch Reservoir

- Multiple areas where the railroad crosses wetlands and is near other water resources (i.e. East Branch Reservoir)


Crossing Kohanza Brook in Danbury

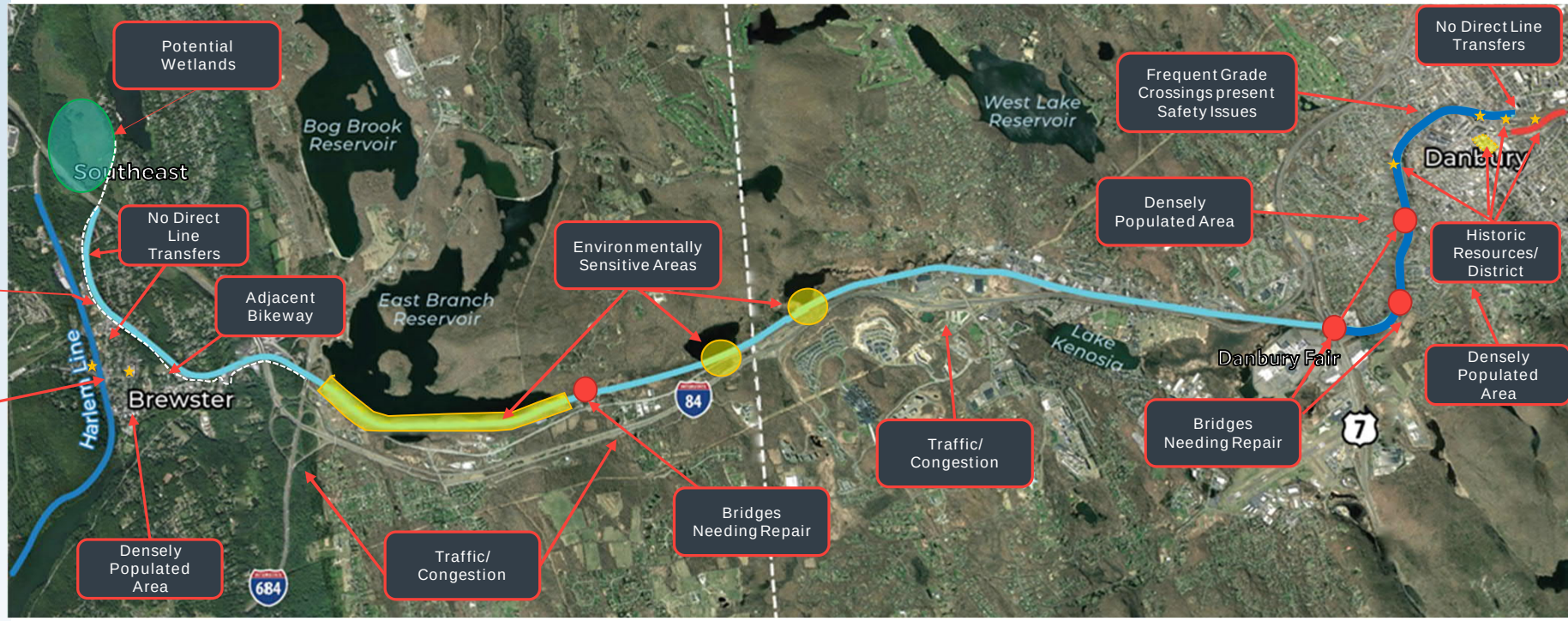
- Residential and other noise-sensitive land uses directly adjacent to the corridor


In Danbury, North of West Street

- Increased likelihood of environmental justice considerations near potential rail connections

What We Found

Existing Corridor Constraints

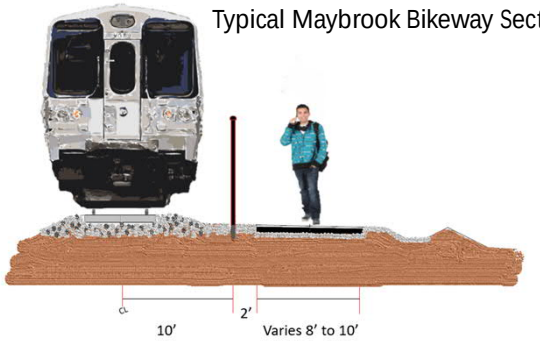


Single Track Double Track

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

Safety and Security Evaluation

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



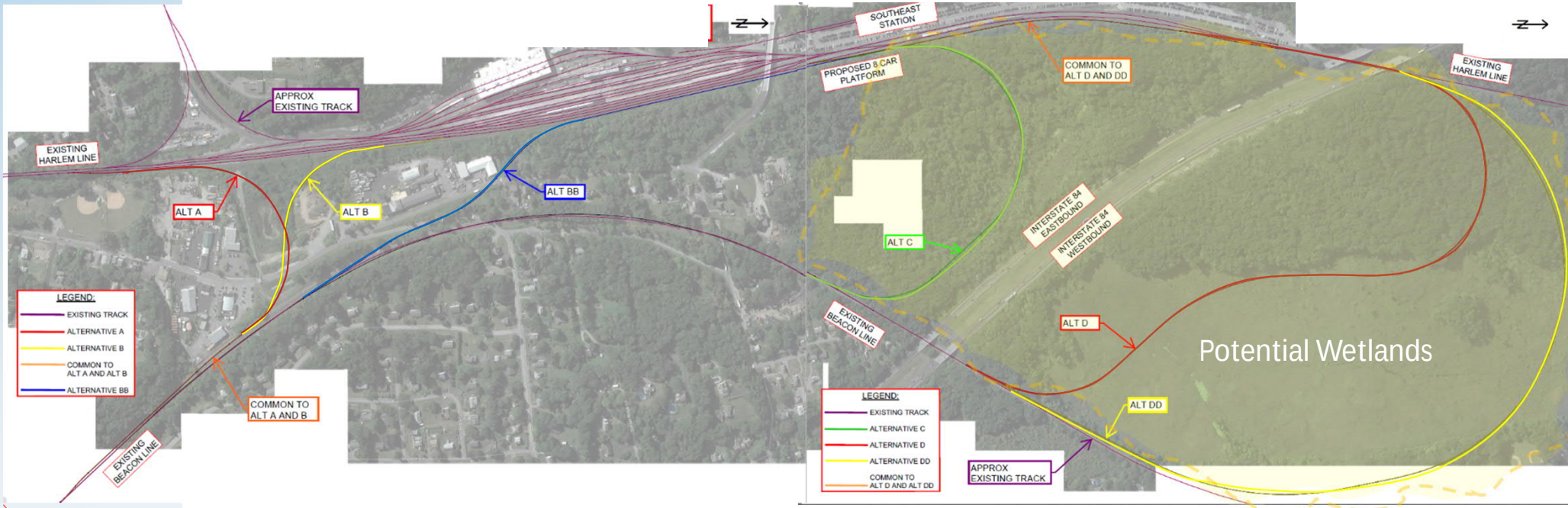
Typical Maybrook Bikeway Section

Infrastructure Alternatives Development

- A series of different concept connections were developed for connecting the Metro-North Branches
- Most line connections have some form of property taking associated with them
- There is significant track curvature on the Beacon Line at each end.
  - Will limit operations within the corridor

What We've Developed

Summary of Brewster/Southeast Connection Alternatives

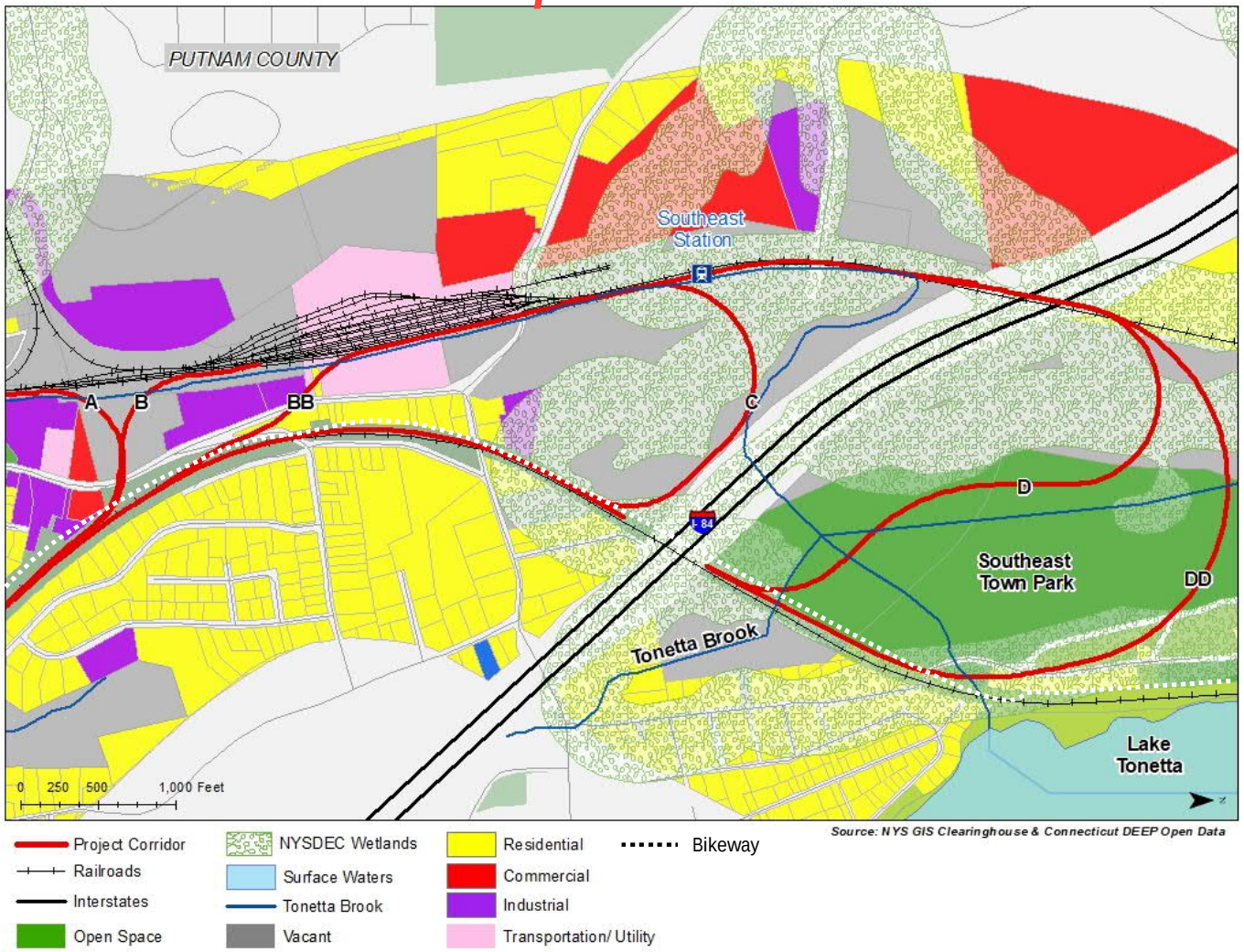


6 Connection Alternatives Developed

What We've Developed

Brewster/Southeast Connection Alternatives

Environmental and Social Impacts

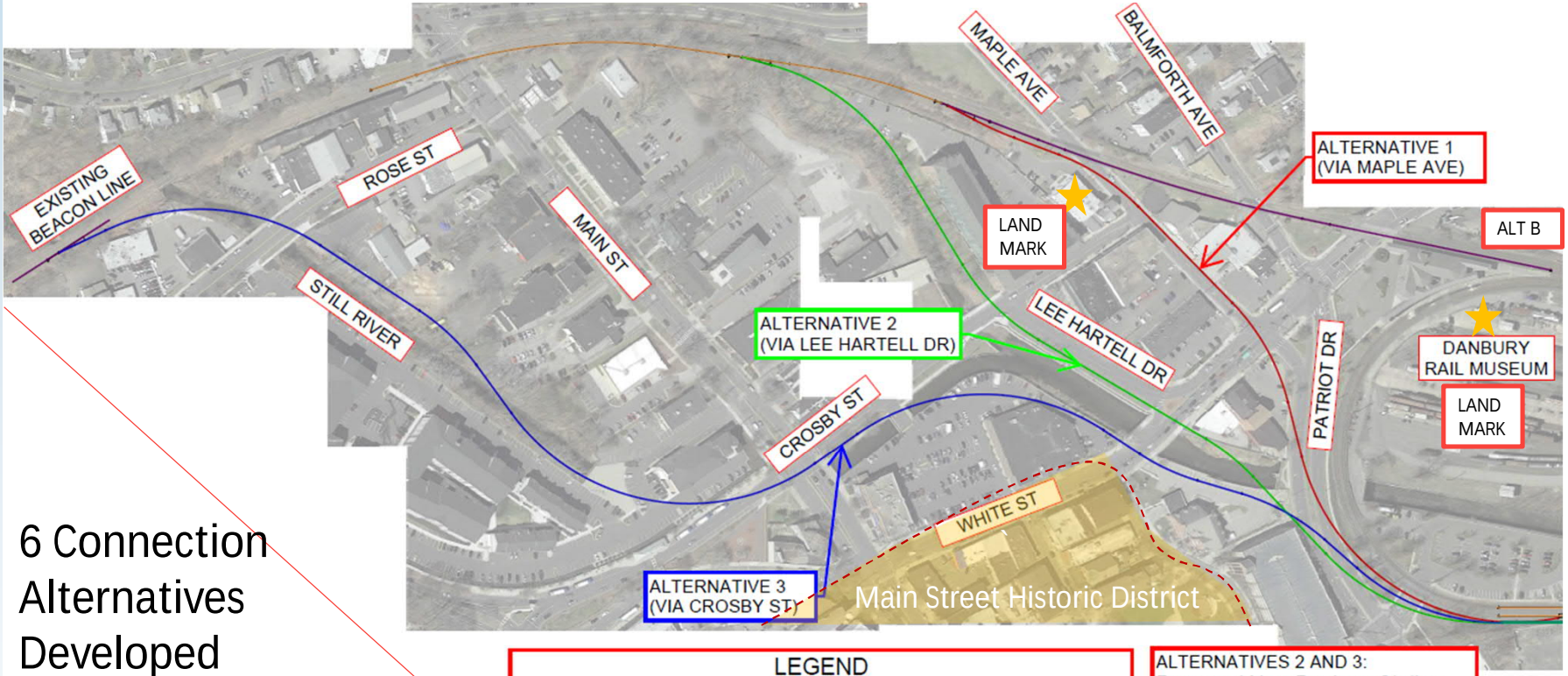


What We've Developed

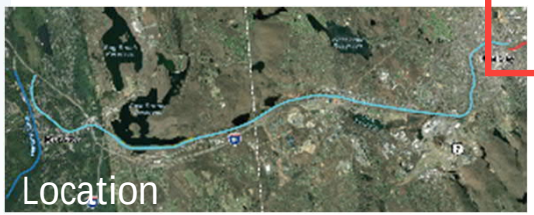
Brewster/Southeast Connection Alternatives Development Summary

Alternative	Issues	Disposition
A Brewster Loop	• Some neighborhood impacts • New grade crossing required • Tight curvature due to Harlem Line switch locations (slow speed) • Incompatible with existing MNR Service Pattern	Dropped.
B Southeast stub-end	• Some neighborhood impacts • Would require yard switch relocation/ modification • New grade crossing required • Difficulty with reverse moves into existing Southeast station	Led to development of Alternative BB
BB Southeast new platform stub-end	• Some neighborhood impacts • New grade crossing required • New station platform with connection • Potential wetlands impacts	
C Southeast Loop south of I-84	• Would require yard switch relocation/ modification • Would still require reverse moves into existing station • Moderate speed curvature • Potential wetlands impacts	Led to development of Alternative D
D Southeast Loop north of I-84 (new platform)	• Would require switch modification • Likely wetlands impacts • New station platform with connection • Moderate speed curvature	Led to development of Alternative DD

Summary of Danbury Connection Alternatives



6 Connection Alternatives Developed



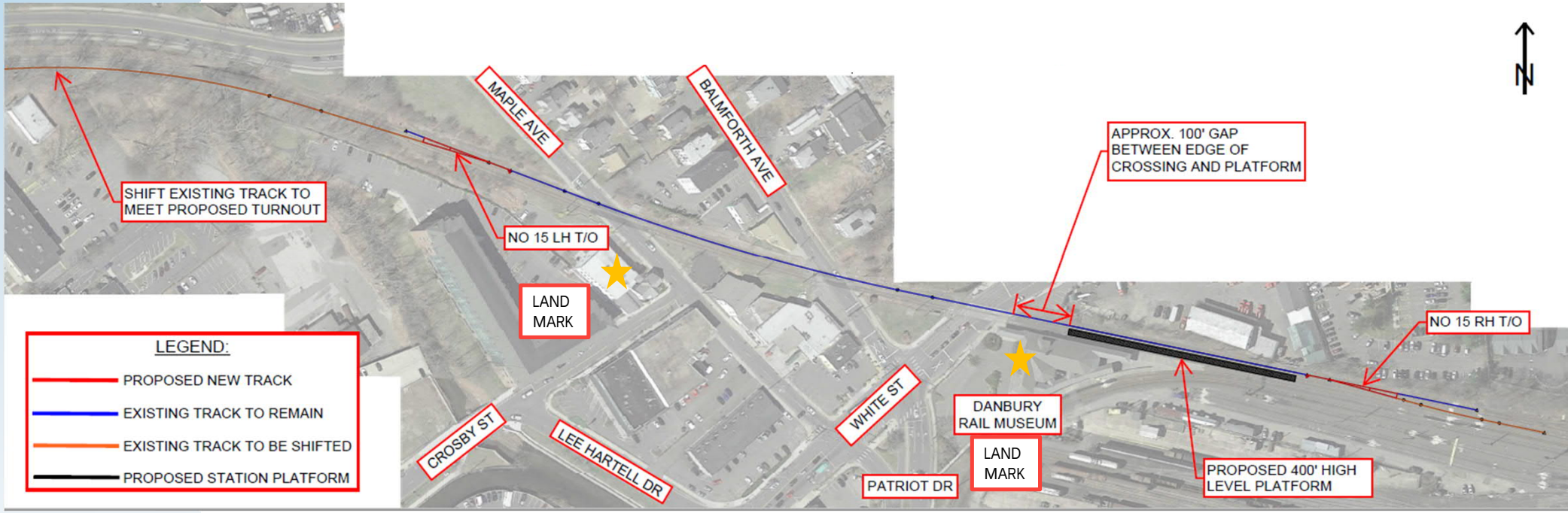
LEGEND

- EXISTING TRACK TO REMAIN (ALT B)
- EXISTING TRACK TO BE SHIFTED (ALT 2 ONLY)
- ALTERNATIVE 1 (MAPLE AVE)
- ALTERNATIVE 2 (LEE HARTELL DR)
- ALTERNATIVE 3 (CROSBY ST)

ALTERNATIVES 2 AND 3:
Proposed New Danbury Station, New Double Track Island Platform, And Meet Existing Danbury Line

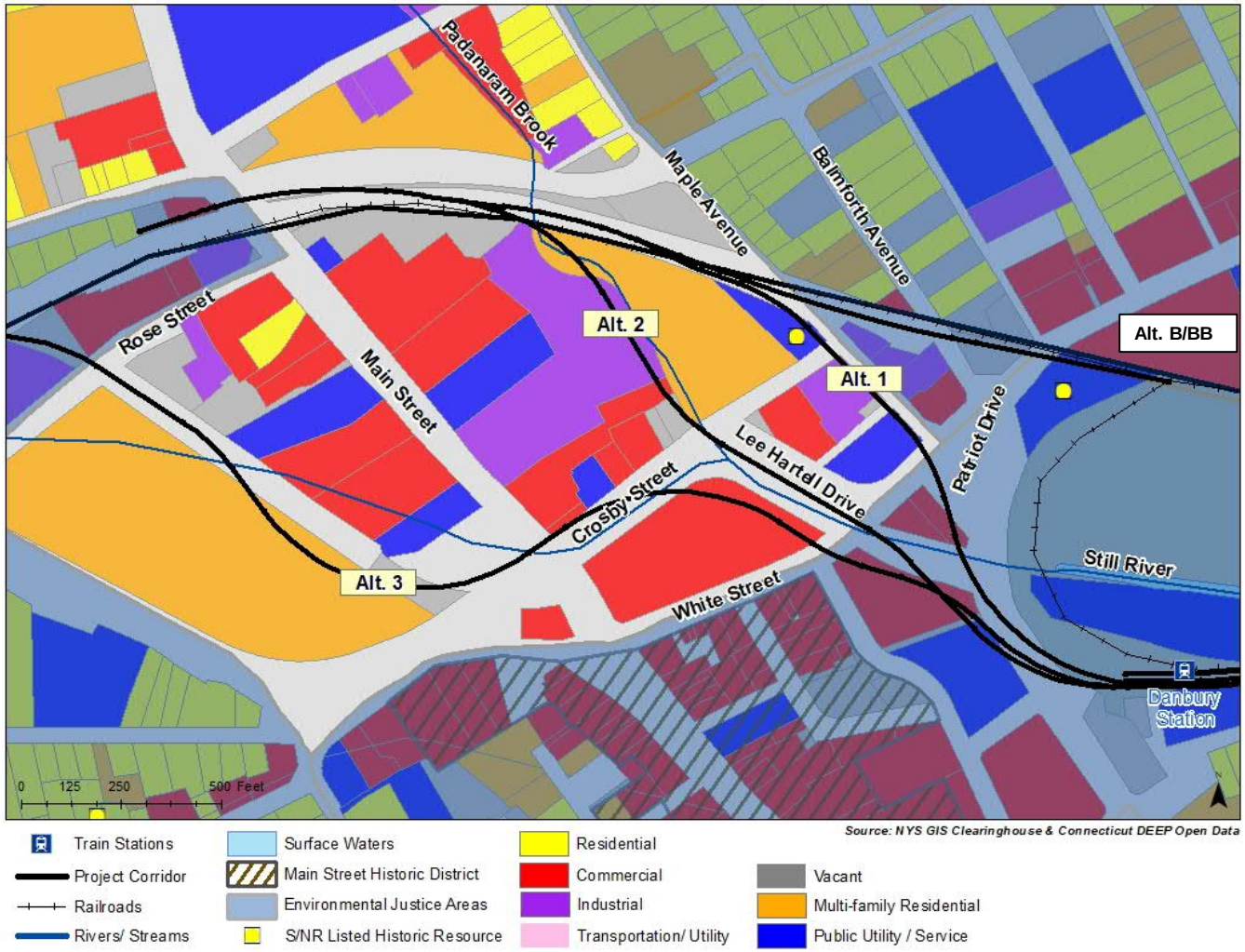
What We've Developed

Danbury Connection Alternative BB



What We've Developed

Danbury Connection Alternatives
Environmental and Social Impacts



What We've Developed

Danbury Connection Alternatives Development Summary

Alternative	Issues	Disposition
A Shortest Direct Connection	• Multiple new grade crossings required • Substandard track curvature to "fit" • Incompatible with current MNR design standards	Dropped. Led to Alternatives 1 & 2
1 Maple Ave Street Running connection	• Multiple new grade crossings required • Would require street running at slow speeds • Slow speed curvature • Neighborhood impacts	
2 Kohanza Brook/Still River (Lee Hartell Dr) Alignment	• Multiple new grade crossings required • Would require decking part of the river • Slow speed curvature • Neighborhood impacts	Dropped. Led to Alternative 3
3 Still River (Crosby Street) Alignment	• Multiple new grade crossings required • Would require decking part of the river • Slow speed curvature • Neighborhood impacts	Dropped.
B Develop Station at Museum Location (no connection to Branch)	• Limited track distance for platform • Difficulty with reverse moves due to adjacent grade crossings and yard loop track • MNR services not directly connected	Led to BB

Infrastructure Connection Alternatives Summary by Station Area

- **BREWSTER**
  - Extremely constrained site
  - Operationally infeasible
  - Alternatives not recommended
- **SOUTHEAST**
  - Existing platform at critical location which affects all concepts
  - All concepts will need to reconcile interaction with the bikeway
  - New platform edge required
  - Thru-operations connections likely to have Wetlands impacts
- **DANBURY**
  - Physical connections more difficult (track geometry)
  - Neighborhood impacts
  - Existing platform difficult to access – may not be able to share
  - Separate platform with pedestrian connections is most viable

Corridor Opportunities

Single Track Double Track

What We've Developed
Service Planning Methodology

- Service frequency targets of 30 minutes peak and hourly off peak for commuter rail alternatives, 15 for light rail
- Existing Southeast and Danbury Station service levels will remain the same due to capacity constraints
  - Will need additional platform edge at Southeast to accommodate new services
- Assumes proposed services originate/terminate at Southeast
  - Brewster Station as a terminus is not feasible
- All commuter rail alternatives are assumed to use Brewster Yard as their maintenance base

What We've Developed

Service Planning Alternatives

Vehicle Type		Proposed Service Frequency	Additional Line Infrastructure required?	New Facilities Required?	Other Issues
FRA Compliant Diesel Multiple Unit		30 min pk, 120 min off pk for Alt 1; 15 min for Alt 4.	Only if service pattern requires	Shop/Yard	Only 1 provider
FRA Compliant Zero Emission Multiple Unit			Only if service pattern requires	Shop/Yard Recharging for Battery or Refueling for Hydrogen	Not widely used (battery) Hydrogen is unproven
Push-pull Diesel/Electric/ Battery Locomotive Hauled		30 min pk 120 min off pk	Only if service pattern requires	Could require updates for battery based	
Electric Multiple Unit		30 min pk 60 min off pk	Full 3rd Rail Electrification	No	
Light Rail Vehicle		15 min	Overhead Electrification	Shop/Yard	Requires separation from others

Service Planning Alternatives

	Existing Conditions	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Build - Danbury Branch	Shuttle	Peak Through	Full Service	Light Rail Transit
Running Time (min)	54	22	22	19	22
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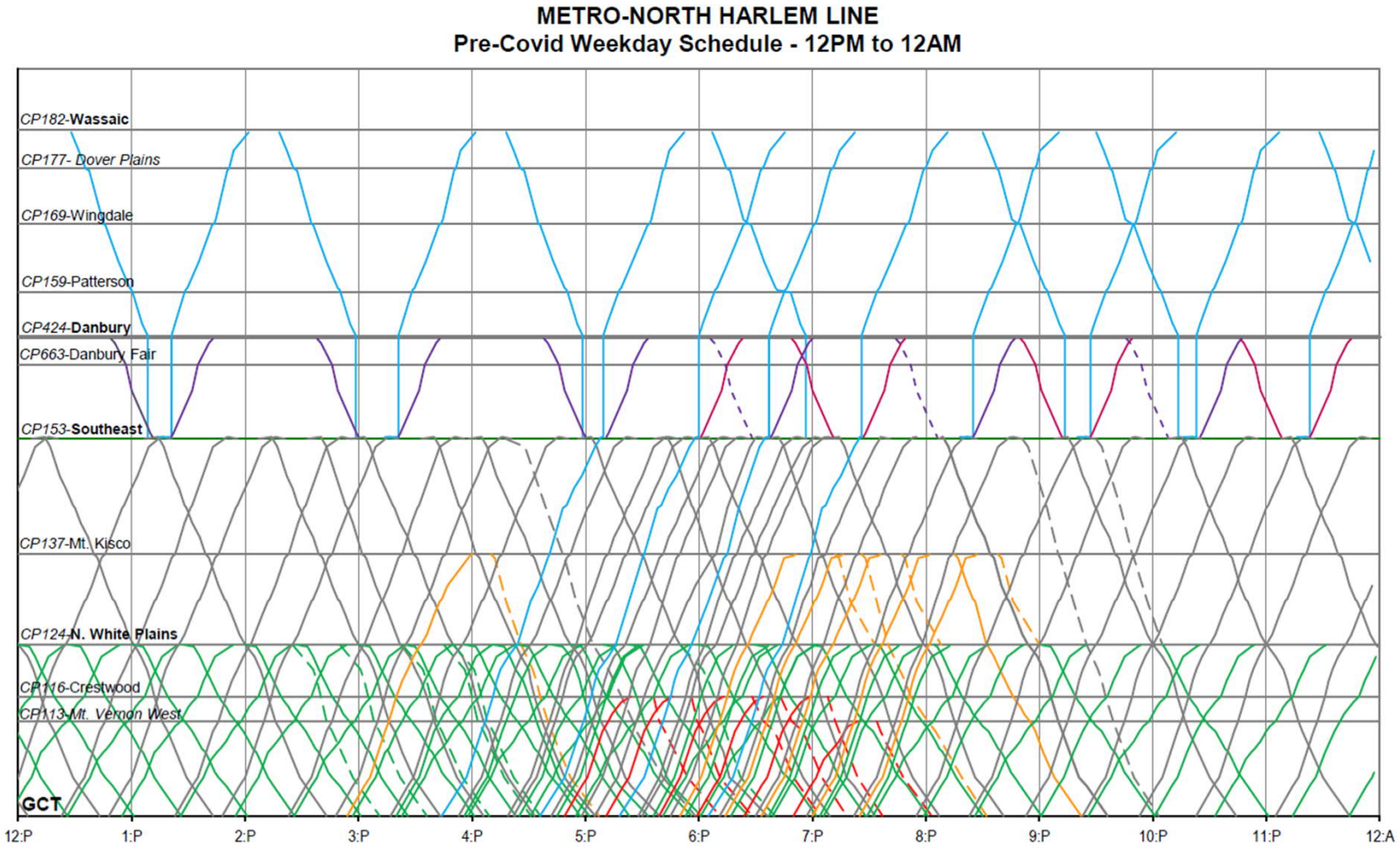
Frequency Off Peak (min)	120-180	120	60-120	60	15
Harlem Line Integration	None	Transfer	Peak through service; off peak transfer	Through service	Transfer
Eastern Terminus	Danbury Station	Danbury Station	Danbury Station	Danbury Station	Danbury Station

Operational constraints: Harlem Line Schedule



Line Infrastructure Elements Needed for Proposed Service Levels

- Depending on service levels operated, a passing siding(s), and/or an extension of the double track portion of the Beacon Line may be needed

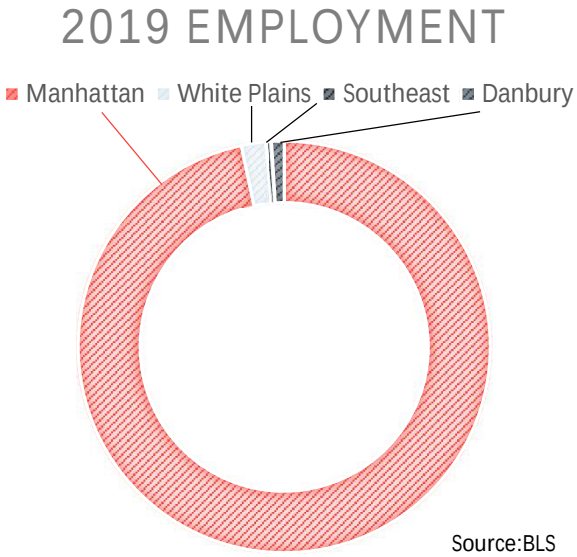
Service Alternative	Passing Siding(s)	Double Track Extension
1: Shuttle Service		✓
2: Peak Through Service (Shuttle off-peak)	✓	✓
3: Full Service (All Day Through)	✓	✓
4: Light Rail Transit	✓✓	✓

Potential Corridor Upgrades

Single Track Double Track

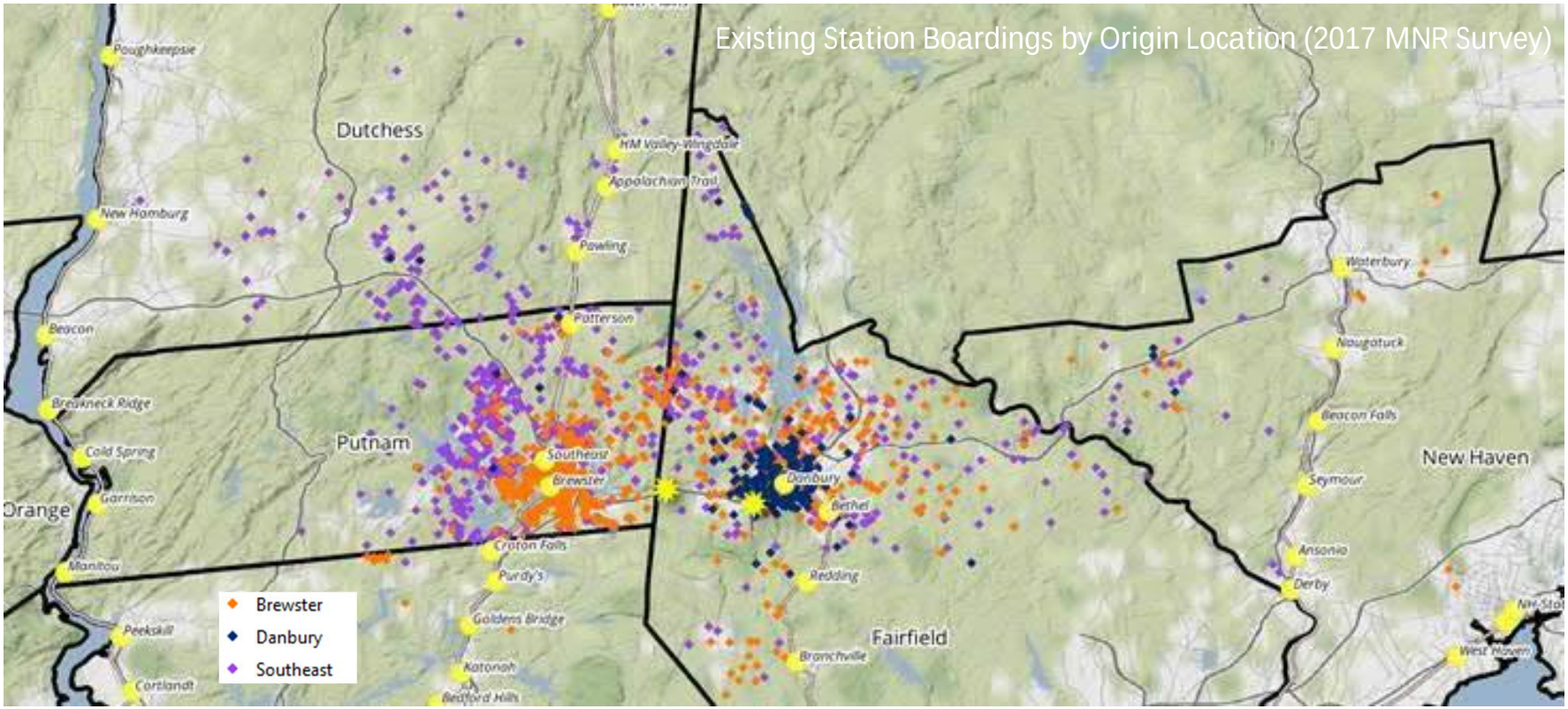
Preliminary Market Forecasts

- STOPS Model of NYMTC area
- Calibrated to 2019 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)
- Preliminary Results for Alternative 1 (Shuttle), Alternative 2 (Peak Through), Alternative 3 (All Day), and Alternative 4 (LRT)

Preliminary Market Considerations



- The catchment area for the potential service ranges as far east as central Dutchess County and as far west as central New Haven County

Preliminary Market Forecasts

Linked trips measure the actual number of complete trips from origin to destination, including transfers; Unlike boardings, which simply count how many people got on or off at a point, and would count transfers independently (double counting).

Linked Trips					Change				Percent Change			
No Build	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
94,570	94,870	94,970	95,120	94,840	300	400	550	270	.3%	.4%	.6%	.3%

Which translates to a decrease in daily PMT

	Alt 1	Alt 2	Alt 3	Alt 4
Change in Person Miles Driven	-15,340	-24,310	-31,700	-15,550

Preliminary Market Forecasts

	Boardings at Danbury, Potential Danbury Fair and State Line Stations (typical weekday to Points South)		
	Total	New	Changing from Drive to the Harlem Line
Alternative 1 Shuttle	630	300	330
Alternative 2 Peak Through	840	400	440
Alternative 3 Full Service	970	550	420
Alternative 4 Light Rail	650	270	380

As a comparison 2019 MNR boardings at Danbury were 181, and 1,123 at Southeast

Preliminary Market Forecasts

- A sensitivity test was performed to estimate the impact of different midday headways and faster travel times (Alternative 2)
  - Reducing the off-peak headway to 60 minutes and reducing running time by 3 minutes increased boardings by 90 people
- A sensitivity test was performed to evaluate the impact of changing the visibility factor in STOPS (Alternative 4)
  - Changing the visibility factor had little effect on the forecast

Next Steps (January – March 2022)

Feasibility Assessments including:

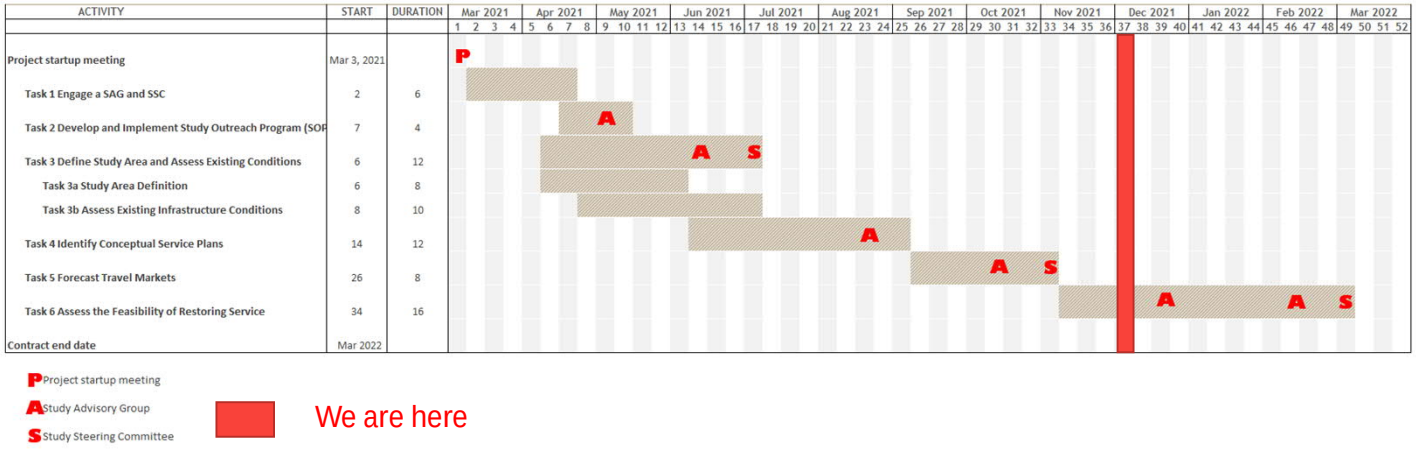
— Economic Analyses

— Capital and Operating Costs

— Potential Funding Opportunities

Upcoming Meetings

Reporting



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Responsive Translation