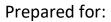
# Appendix V Alternative Alignment Analysis V-1: Alternative Alignments Analysis (February 2022)

## **HUDSON HIGHLANDS FJORD TRAIL**

## **Alternative Alignments Analysis**



Hudson Highlands Fjord Trail, Inc.

SLR #142.17391.00001.0050

February 2022





### **Alternative Alignments Analysis**

Prepared for: Hudson Highlands Fjord Trail, Inc. One Civic Center Plaza, Suite 200 Poughkeepsie, NY 12601

This document has been prepared by SLR Engineering, Landscape Architecture, and Land Surveying, P.C. (SLR). The material and data in this report were prepared under the supervision and direction of the undersigned.

Michael T. Doherty, PLA Principal Landscape Architect



## **CONTENTS**

		LANDS FJORD TRAIL PROJECT VISION	
MAII	N TRAIL – I	MINIMUM PERFORMANCE CRITERIA	3
ALTE	RNATIVE A	ALIGNMENT ANALYSIS PROCEDURE	4
ALTE	RNATIVES	ANALYSIS MATRIX	5
ALTE	RNATIVE A	ALIGNMENT IMPACT AND CONSTRAINT SUMMARY	8
ALTE	RNATIVE A	ALIGNMENT ANALYSIS	12
7.1	REACH	NO. 1 – DOCKSIDE PARK TO LITTLE STONY POINT	12
	7.1.1	Alignment Descriptions	12
	7.1.2	Analysis and Rating Summary	
	7.1.3	Detailed Alignment Findings and Recommendations	
7.2	REACH	NO. 2 – LITTLE STONY POINT TO BREAKNECK	
	7.2.1	Alignment Descriptions	
	7.2.2	Analysis and Rating Summary	
	7.2.3	Detailed Alignment Findings and Recommendations	
7.3	REACH	NO. 3 – BREAKNECK CONNECTOR	
	7.3.1	Alignment Description	
	7.3.2	Detailed Alignment Findings and Recommendations	
7.4	REACH	NO. 4 – BREAKNECK CONNECTOR TO BEACON	
	7.4.1	Alignment Descriptions	
	7.4.2	Analysis and Rating Summary	
	7.4.3	Detailed Alignment Findings and Recommendations	43
ALTE	RNATIVES	ANALYSIS SUMMARY	50
LIMI	TATIONS		51

#### **APPENDICES**

Appendix A	Decision Matrix Category Scoring Criteria & Results
Appendix B	Alignment Plans and Sections - Reach No. 1
Appendix C	Alignment Plans and Sections - Reach No. 2
Appendix D	Alignment Plans and Sections - Reach Nos. 3 and 4



#### 1. INTRODUCTION

This document presents the alternatives analysis for the Main Trail route of the Hudson Highlands Fjord Trail (HHFT). The HHFT Main Trail is a proposed 7.5-mile unique recreational experience as presented in the Hudson Highlands Fjord Trail Master Plan (2020). The project will connect some of the Hudson Valley's most visited destinations while highlighting the Hudson Highlands' landscapes of distinction through a unique linear park of movement and rest, destinations, and journeys. The project aims to restore, rehabilitate, and reconnect the shoreline corridor and surrounding forested and wetland landscapes for the enjoyment of current and future generations.

This alternatives analysis evaluates multiple alignments through four defined reaches within three geographic sections between the village of Cold Spring and city of Beacon:

- Shoreline This section extends from Dockside Park in the village of Cold Spring to Breakneck Ridge and contains two separate and defined reaches in the alternative analysis, Reach No. 1 Dockside Park to Little Stony Point and Reach No. 2 Little Stony Point to Breakneck Ridge.
- Breakneck Connector This section extends from the Breakneck Ridge Trailhead to the Metro-North Railroad (MNR) pedestrian bridge and is referred to as Reach No. 3.
- Forest This section extends from the MNR pedestrian bridge to Long Dock Park in Beacon and is referred to as Reach No. 4.



#### 2. HUDSON HIGHLANDS FJORD TRAIL PROJECT VISION

The project vision is best summarized in this excerpt from the Hudson Highlands Ford Trail Master Plan, February 2020:

The Fjord Trail creates 14.5 new miles of privately maintained public paths that trace the Hudson River and offer unique glimpses into the diverse landscapes of the Hudson Highlands. It is a place with varied scales of spaces and aesthetic experiences that emerge along the slender route, offering new ways to inhabit and understand the Highlands region. It is a portal that links the City of Beacon and the Village of Cold Spring to the water's edge and the greater Hudson Valley region, and connects urban residents of New York City to the scenic beauty and restorative power of the river and the highlands landscape.

Finally, it is a preserve that protects and restores the landscape, inspiring conservation, stewardship, and engagement in the ecological cycles and patterns that are so often invisible in our busy lives. These ambitions combine to create a linear public landscape that connects over 8,000 acres of Hudson Highlands State Park Preserve directly to the Hudson River.

The project strives to reveal the landscapes of the river to all people, regardless of age, background, or ability level. A single, shared trail for all unites the project and connects the Village of Cold Spring with the City of Beacon.



#### 3. MAIN TRAIL – MINIMUM PERFORMANCE CRITERIA

The master plan delineates both a Main Trail and "meanders" or spur paths. The 7.5-mile Main Trail connects Cold Spring to Beacon and is defined as an accessible, walkable, and bikeable path that remains consistent in facility type to inspire user confidence in the trail system. Meanders are for quick departures to destinations and adventures, are pedestrian only, and are meant to provide an expanded and unique hiking experience; they are not required to have a consistent width or material and vary based on the terrain they traverse. For the purposes of this analysis, we are focused <u>only</u> on the Main Trail route and how each of the alternatives considered compares to the vision and performance criteria established by the 2020 Hudson Highlands Fjord Trail Master Plan.

The Main Trail is to be a "trail for all," an accessible route following the guidelines established by the *Unites States Access Board's Final Accessibility Guidelines for Outdoor Developed Areas* (AGODA). The following is a brief overview of the minimum accessible standards for the Main Trail:

- 1:20 (5%) running slope for not greater than 50 feet
- 1:12 (8.33%) running slope for not greater than 30 feet
- Cross slope of paved or wood surfaces not greater than 1:48 (2%)
- 8-foot minimum vertical clearance
- Firm and stable surface
- ½-inch maximum rise in surface irregularity in paved or wood surfaces

The 2020 Hudson Highlands Fjord Master Plan has established a unique vision beyond a typical multiuse trail and as such has established a minimum performance baseline that the Main Trail must achieve to reach desired goals. The minimum standards include but are not limited to the following:

- The Main Trail has a 10-foot minimum width with 12 to 14 feet being preferred, excluding shoulders, for bidirectional pedestrian, bicycle, and nonmotorized traffic.
- The Main Trail maintains minimum overhead clearances of 8 feet and side clearances of 6 feet.
- The Main Trail minimum design elevation is 8 feet NAVD88, planned to clear Mean Higher High Water (MHHW) and 75-inch Sea Level Rise (SLR) (2100 high projection established by New York State in 6 NYCRR Part 490, Project Sea Level Rise). MHHW tidal data is taken from the online version of the National Oceanic and Atmospheric Administration's (NOAA) VDatum software
- The Main Trail minimum design elevation is 8 feet NAVD88, above the 100-year (1% annual chance) storm assumption for 2020 (7.3 feet NAVD88).

The Main Trail should directly connect the following key destinations:

- Long Dock Park
- Dennings Point
- Notch (Dutchess Junction Park)
- Dutchess Manor
- Breakneck Ridge
- Little Stony Point
- Dockside Park

Several other local and regional destinations exist along the proposed route including popular hiking trailheads.



#### 4. ALTERNATIVE ALIGNMENT ANALYSIS PROCEDURE

The evaluation of the alternate alignments was conducted through desktop reviews of pertinent and available mapping, planning documents, and regulatory frameworks as well as through a series of field investigations and ongoing discussions with the project design team and key stakeholders. The alternative alignments were established previously during the master planning process and refined through this study as needed to best evaluate and document the potential for alternate routes that meet the needs of the Master Plan vision, surrounding communities, and stakeholders.

The alternative alignments are mapped in four designated areas or reaches and are identified as follows:

- Reach 1 Dockside Park to Little Stony Point
- Reach 2 Little Stony Point to Breakneck
- Reach 3 Breakneck Connector
- Reach 4 Breakneck Connector to Beacon

For each reach, the analysis reviews and scores the draft preferred Main Trail alignment as contained in the Master Plan and any alternative alignments considered in the determination of that route. The mapping is a high-level representation of routes and should be viewed as a master plan level of design. Opportunities and constraints are identified on the mapping and summarized in the following narratives. To assist in the evaluation, a decision, or ranking, matrix was established that set a criterion of baseline performance information to evaluate all alignments, including the Master Plan defined Main Trail alignment.



#### 5. ALTERNATIVES ANALYSIS MATRIX

The ranking matrix provides guidance regarding a trail alignment's apparent suitability consistent with the established goals, performance criteria, policies, and environmental characteristics defined by the Hudson Highlands Fjord Master Plan.

The matrix comprises ten specific criteria established from the overall project goals and performance, information gathered throughout the master plan process, and ongoing meetings with key stakeholders, including but not limited to the Towns of Fishkill and Philipstown, the Village of Cold Spring and City of Beacon, the Metro-North Railroad (MNR), the New York State Department of Parks Recreation & Historic Preservation, and the New York State Department of Environmental Conservation.

The following categories have been established to evaluate the alternative alignments. All categories will be rated on a scale of one to five (1 to 5) with five being most preferred. Refer to the scoring matrix included in each Reach narrative section and Appendix A for more information.

<u>Alignment Design</u> – Alignments will be evaluated against desired width and clearances, inclusion of multimodal users in a single facility, consistency of form and material, and meeting resiliency goals for the minimum sea-level rise and 100-year flood elevations as defined in the Performance Criteria.

<u>Traffic and Safety</u> – Prioritize alignments that are universally accessible; limit at-grade crossings of roads, intersections, and driveways; improve safety along State Route 9D (9D); promote traffic calming; provide separation or buffers to vehicular travelways; and ease emergency response.

<u>Context</u> – Prioritize alignments that offer the most scenic, ecological, and cultural experience of the Hudson Highlands while blending seamlessly into the surrounding environment. Emphasis will be placed on views, vistas, variety of environment traversed, increased public access particularly to water-based activities, and separation from vehicular travelways. Alignments alongside low-volume and low-speed roads (25 miles per hour or less) will be considered more advantageous.

<u>Connectivity</u> – Prioritize alignments that foster connection to the visual and physical beauty of the Hudson Highlands landscape, ecology, and history. Emphasis will be given to alignments that seek out opportunities to reunite with the river's edge; create educational opportunities; and connect regional trails, parks, and local destinations.

<u>Diversity of Users</u> – Prioritize alignments that amplify universal accessibility and safety and create a unique multimodal and recreational experience for all ages and abilities.

<u>Congestion Management</u> – Prioritize alignments that manage access to popular destinations and sensitive sites, minimize negative impacts on community and environment, and promote new experiences, destinations, and narratives to explore.

<u>Regional Support</u> – Prioritize alignments that expand the region's recreational amenities, enhance access to existing or planned facilities, and have a high level of community support.



<u>Environmental Stewardship</u> – Prioritize alignments that minimize impacts on the environment while promoting ecological health, ecological processes, and preserving and enhancing the region's scenic beauty. Emphasis will be placed on protection and enhancement of environmentally sensitive resources such as floodplains, wetlands, steep slopes, or erodible soils; vegetative communities and buffers; threatened, endangered, or rare species; and historical and cultural resources.

<u>Community</u> — Prioritize alignments that minimize impacts on natural and man-made features particularly of statewide significance, including geologic formations, vegetation, and structures; on private property and utilities; and that limit the need for easements and acquisitions and disruption of community fabric.

<u>Implementation</u> – Prioritize alignments that are feasible, sustainable, and cost effective with fewer design challenges and impacts on the community.

## Hudson Highland Fjord Trail - Alternative Alignments Decision Matrix

Criteria	Maximum Category Score		Master Plan Main Trail	Alignment No. 1	Alignment No. 2	Alignment No. 3	Alignment No. 4	Alignment No. 5
Alignment Type – Alignments will be evaluated against desired width and clearances, inclusion of multi-modal users in a single facility, and consistency of form and material.	5							
Resiliency – Alignments will be evaluated against desired minimum sea-level rise and 100-year flood elevations as defined in the Performance Criteria	5							
Traffic & Safety – Prioritize alignments that are universally accessible, limit at-grade crossings of roads, intersections and driveways, improve safety along Route 9D, promote traffic calming, provide separation or buffers to vehicular travel ways, and enhance emergency response	5				2			
Context - Prioritize alignments that offer the most scenic, ecological, and cultural experience of the Hudson Highlands while blending seamlessly into the surrounding environment	5	ony Point						
Connectivity - Prioritize alignments that foster connection to the visual and physical beauty of the Hudson Highlands landscape, ecology, and history	5	to Little St						
<b>Diversity of Users</b> - Prioritize alignments that amplify universal accessibility, safety, and create a unique multimodal and recreational experience for all ages and abilities	5	Dockside Park to Little Stony Point						
Congestion Mangement - Prioritize alignments that manage access to popular destinations and sensitive sites, minimize negative impacts to community and environment, and promote new experiences, destinations, and narratives to explore	5	No. 1						
Regional Support - Prioritize alignments that expand the region's recreational amenities, enhance access to existing or planned facilities, and have a high level of community support	5	Reach						
Stewardship - Prioritize alignments that minimize impacts to the environment while restoring ecological health and resiliency, promoting ecological processes, and preserving and enhancing the regions scenic beauty.	5							
Community – Prioritize alignments that minimize impacts to private property, utilities, limits the need for easements and acquisitions and disruption to community fabric	5							
Implementation - Prioritize alignments that are feasible, sustainable, and cost effective with fewer design challenges and impacts to the community	5							
Total Score			0	0	0	0	0	0
Ranking Per Reach			U	U	J	U	U	U



# 6. ALTERNATIVE ALIGNMENT IMPACT AND CONSTRAINT SUMMARY

The following graphics provide an at-a-glance summary of the major obstacles, impacts, and constraint conditions within the project area as they relate to the alternative alignments. The Impact & Constraint Categories, shown in Table 6.1, are derived from the Alternative Analysis Matrix as key issues that occur in many of the alignments considered. Table 6.2 indicates the relationship between the Impact & Constraint Categories and the Alternative Analysis Matrix.

**Table 6.1 Impact & Constraint Categories** 

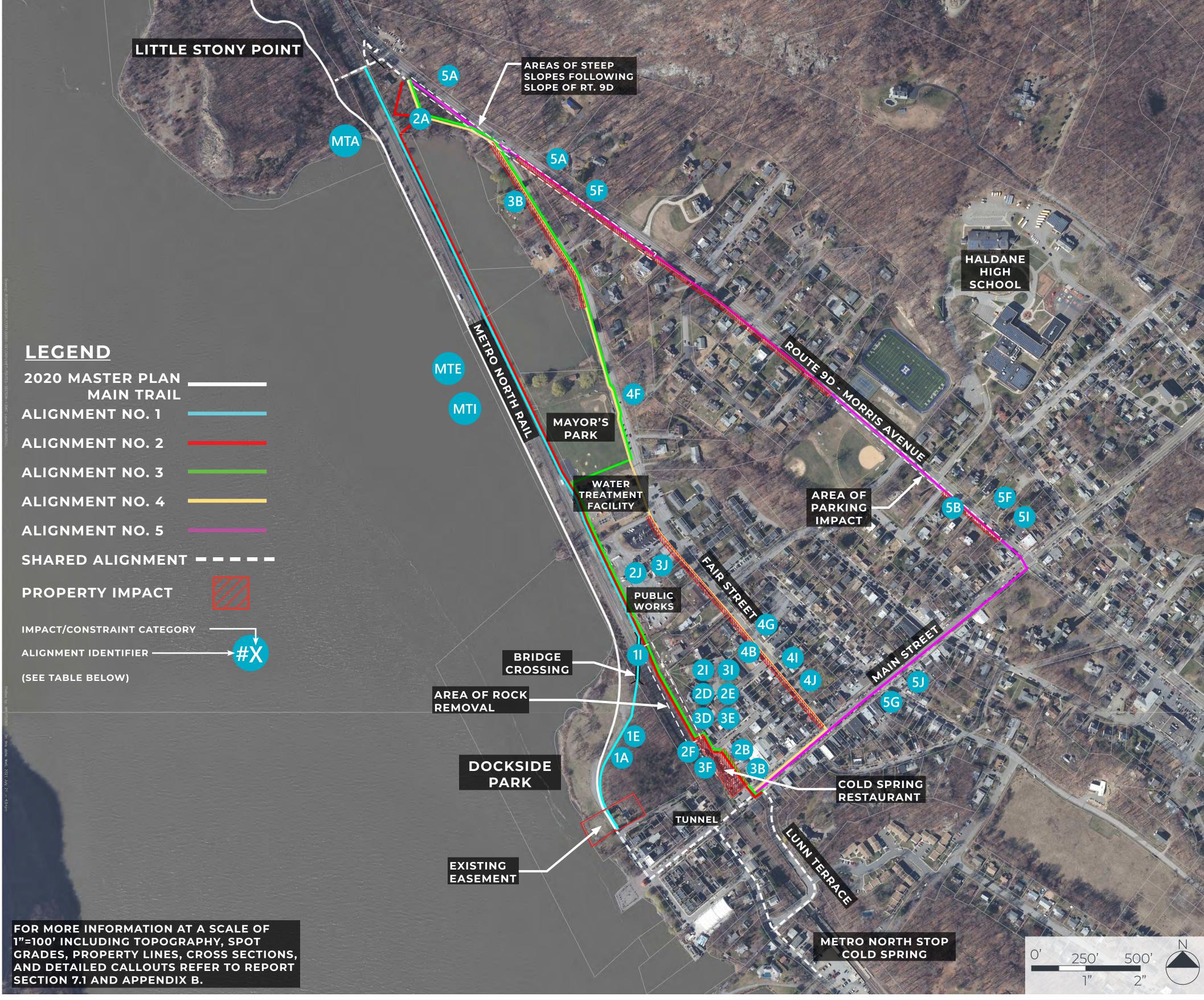
Tubic c	or impact & constraint categories
A	Accessibility (Excessive distances at or near maximum allowed running slope of 5% preferred, 8% maximum)
В	Private Property Impacts
С	Requires MNR or New York State Department of Transportation (NYSDOT) Approval
D	Earthwork (Excessive Cut, Fill, or Rock Removal)
E	Vegetation Clearing
F	Impact on Existing Infrastructure
G	Potential for Vehicular Conflicts
н	Limited Construction or Emergency Access
I	Quality-of-Life Impacts (Views, Noise, Traffic, etc.)
J	Impact of Adjacent Land Use

Table 6.2

	T
Alternative Analysis Matrix Categories	Related Impact & Constraint Categories
Alignment Type	A, C
Traffic & Safety	G, H, I
Context	B, D, E
Connectivity	A, B, G
Diversity of Users	A, G
Congestion Management	F, G
Regional Support	A, B, C, I, J
Stewardship	D, E
Community	B, D, E, F, I, J
Implementation	B, C, D, H,

The following mapping utilizes keyed graphic bubbles to indicate the appropriate Alignment number (#) and the associated Impact category letter designation (X) to identify the general location of the constraint. In some instances, the impact occurs more than once or over long distances of the route.

Refer to Section 7 for more detailed graphic plans and narrative descriptions of each alignment.

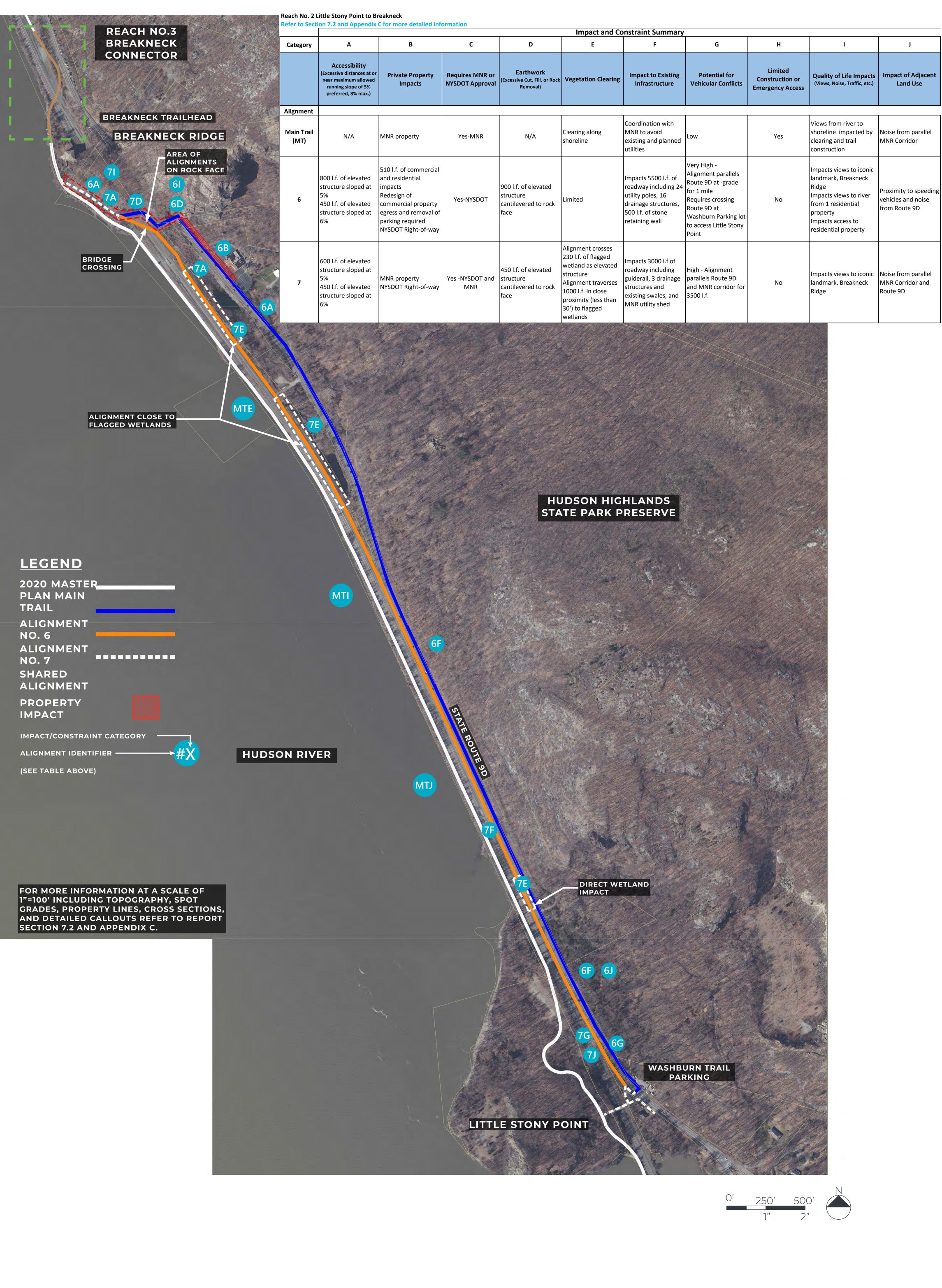


Reach No. 1 Dockside Park to Little Stony Point

<b>C</b> : 1		5	_		Impact and					
Category	A	В	С	D	E	F	G	Н	'	J
	Accessibility (Excessive distances at or near maximum allowed running slope of 5% preferred, 8% max.)	Private Property Impacts	Requires MNR or NYSDOT Approval	Earthwork (Excessive Cut, Fill, or Rock Removal)	Vegetation Clearing	Impact to Existing Infrastructure	Potential for Vehicular Conflicts	Limited Construction or Emergency Access	Quality of Life Impacts (Views, Noise, Traffic, etc.)	Impact of Adjacent Land Use
Alignment		I							l	I
Main Trail (MT)	600 l.f. of elevated structure sloped at 5% to access Little Stony Point	MNR property	Yes-MNR	N/A	Alignment will be designed to avoid mature or select vegetation to remain along the 2500 l.f. of MNR corridor Clearing of approximately 3000 s.f. of scrub shrub within Dockside Park	Requires coordination with MNR and NYS Parks	None	Yes	Views from river to shoreline impacted by clearing and trail construction	Noise from parallel MNR Corridor
1	400 l.f. of elevated trail sloped at 7.5% 600 l.f. of elevated trail sloped at 5%	MNR property including vertical clearances for a new pedestrian bridge crossing	Yes-MNR including air rights for pedestrian bridge crossing	N/A	Clearing approx. 5000 s.f. in Dockside Park for bridge crossing	Requires coordination with MNR and NYS Parks	None	Yes	Bridge and elevated trail will create an obstruction to waterfront views from 5 adjacent residential properties for approx. 400 l.f.	Noise from parallel MNR Corridor
2	200 l.f. switchback required to reach NYS Parks Property at Little Stony Point	1 Property Impacted at Cold Spring Depot Alignment traverses 360 linear feet of private property and will impact service yard of Cold Spring Depot Restaurant MNR property	Yes-MNR	Approx. removal of 2,500 cubic yards of rock over 450 linear feet of trail route	450 linear feet of clearing impacting buffer to railroad at 5 residential properties at Northern Gate road	Requires coordination with MNR and NYS Parks Directly impacts service yard of Cold Spring Restaurant	None	Yes	Clearing of vegetation and rock blasting will effect 5 residential and 1 commercial property	
3	None	1 Property Impacted at Cold Spring Depot Alignment traverses 360 linear feet of private property and impacts service yard of Cold Spring Depot Restaurant, Potential for impacts to frontage of 3 properties on Fair Street MNR Property	Yes-MNR	Approx. removal of 2,500 cubic yards of rock over 450 linear feet of trail route	450 linear feet of clearing impacting buffer to railroad at 5 residential properties at Northern Gate road	Requires coordination with MNR and NYS Parks Directly impacts service yard of Cold Spring Restaurant Impacts to Mayor's Park 460 I.f. frontage including fencing, parking and athletic facilities	Low - Alignment adjacent to Fair Street and Route 9D for a short distance	Partial	Clearing of vegetation and rock blasting will effect 5 residential and 1 commercial property	
4	None	17 properties along Fair Street, 3125 l.f. of trail along properties' frontage	No	N/A	Limited street tree clearing	I.f. frontage including fencing, parking and athletic facilities 500 l.f. of Fair Street to be reconstructed above elev.8	Medium - Alignment requires on-road facilities Sidepath alignment on Fair street 8 intersection crossings and numerous driveway crossings	No	Increased traffic, noise, litter, and trespassing Cold Spring residents have expressed concerns and opposition to this route at past public meetings and written comments received from July to November 2016.	3125 l.f. of trail traverses front yards of residential properties
5	1000 l.f. at or above 8% as alignment follows Route 9D headed towards Little Stony Point	12 properties adjacent to Route 9D	Yes-NYSDOT	N/A	Limited street tree clearing	removed on Route 9D 325 l.f. or parking affected at Halstad Park 1000 l.f. of retaining wall construction, guiderail	High - Requires bicyclists to share the road for 0.7 miles Includes 14 non-signalized intersection crossings & 1 signalized crossing Includes over 20 residential driveway crossings	No	Removal of on-street parking and impacts to front yards along Route 9D	Alignment traverses 0.6 miles through village business district 1400 l.f. of alignment traverses front yards of residential properties

# REACH NO.1 - DOCKSIDE PARK TO LITTLE STONY POINT

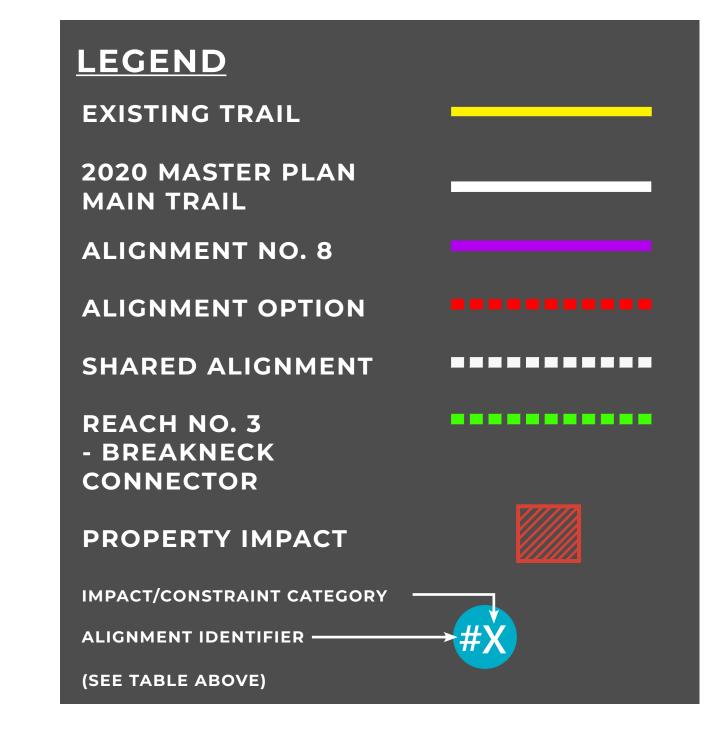
ALTERNATIVE ROUTING ANALYSIS
HUDSON HIGHLANDS FJORD TRAIL
IMPACTS AND CONSTRAINTS SUMMARY



Registration No. 083112

		or more detailed informate impact and	Constraint Summary			
Categories	Alignment	Main Trail (MT)	8	8 - Route Option 1 (8-1)	8 - Route Option 2 (8-2)	
A	Accessibility (Excessive distances at or near maximum allowed running slope of 5% preferred, 8% max.)	Alignment will meet access goals but requires sections of circuitous routing to traverse steep terrain at an acceptable gradient	1500 l.f. along Route 9D sloped between 6-8% Grades along Grandview and South Avenue are 6- 10% for over 1800 l.f.	1800 l.f. sloped at 5% requiring multiple switchbacks on steep terrain	2600 l.f. sloped at 5% requiring multiple switchbacks on steep terrain	
В	Private Property Impacts	Traverses 8 residential properties requiring permanent access rights to be granted	Impacts the frontage of approximately 30 residential properties requiring at a minimum temporary construction access. Permanent easements or acquisitions are likely	None	None	
С	Requires MNR or NYSDOT Approval	No	Yes-NYSDOT	No	No	
D	Earthwork (Excessive Cut, Fill, or Rock Removal)	Alignment requires approximate 8,000 l.f. of bench cut trail due traversing steep side slopes	Alignment requires approximately 5,500 l.f. within a fill condition to allow for the trail to parallel Route 9D while traversing steep side slopes	Route option requires a grade change of 100 feet over approximately 1800 l.f. with the potential to produce greater than 10,000 c.y. of material	grade change of 150 feet over approximatel 3600 l.f. with the potential to produce	
E	Vegetation Clearing	Approximately 18,000 l.f. of trail requiring 360,000 s.f. of clearing (8.3 acres)		Approximately 32,000 s.f. (0.7 acres)	Approximately 72,000 s.f. (1.65 acres)	
F	Impact to Existing Infrastructure	None	Existing utility poles, drainage structures and guardrails will be effected along Route 9D 425 l.f. of existing boardwalk at Madam Brett Park requires reconstruction to accommodate two way traffic	None	None	
G	Potential for Vehicular Conflicts	None	Very High - alignment parallels Route 9D at - grade for 2.5 miles 15 Driveway crossings 3 Intersection crossings	None	None	
н	Limited Construction or Emergency Access	Construction access will be difficult due to steep topography	No	Construction access will be difficult due to steep topography		
I	Quality of Life Impacts (Views, Noise, Traffic, etc.)	Route traverses backyards of residential properties Significant clearing along route	Route traverses front yards of residential properties Impacts mailboxes, landscaping, stonewalls, parking, driveways	None	None	
J	Impact of Adjacent Land Use	None	Proximity to speeding vehicles and noise from Route 9D	None	None	

LONG DOCK PARK	DIA BEACON ART MUSEUM
DENNINGS POINT STATE PARK  FISHKILI CREEK	MADAM BRETT PARK  BRIDGE CROSSING  8A  PROPERTY IMPACT
HUDSON RIVER  MTI  POLLEPEL	DUTCHESS JUNCTION PARK 8E 8-2A 8-2D 8-2A 8-2D 8-2A 8-2D 8-B-1A 8-1D
FOR MORE INFORMATION AT A SCALE OF 1"=100' INCLUDING TOPOGRAPHY, SPOT GRADES, PROPERTY LINES, CROSS SECTION AND DETAILED CALLOUTS REFER TO REPOR SECTION 7.4 AND APPENDIX D.	END REACH NO.3, BEGIN REACH NO.4  HUDSON HIGHLANDS STATE PARK PRESERVE



Route 9D



# REACH NO.4 - BREAKNECK CONNECTOR TO BEACON

**ALTERNATIVE ROUTING ANALYSIS HUDSON HIGHLANDS FJORD TRAIL** IMPACTS AND CONSTRAINTS SUMMARY



#### 7. ALTERNATIVE ALIGNMENT ANALYSIS

#### 7.1 REACH NO. 1 – DOCKSIDE PARK TO LITTLE STONY POINT

#### 7.1.1 Alignment Descriptions

For this reach, the Master Plan route and five alternatives were reviewed and evaluated. For more information at a scale of 1"=100' including topography, spot grades, property lines, cross sections, and detailed callouts, refer to plan sheets 1 through 6 included in Appendix B of this report.

#### 2020 Master Plan Main Trail

This route connects primarily via an elevated structure along the west side of the MNR causeway to the existing Little Stony Point on-grade trail just west of the pedestrian bridge over the MNR tracks from Route 9D.

#### Alignment No. 1

This route departs Dockside Park east over the tracks via a pedestrian bridge and then parallels the tracks on the east side between the Cold Spring Public Works yard, wastewater treatment plant, and Mayor's Park before continuing onto the east side of the MNR causeway on an elevated structure to the grade up to the west side of 9D adjacent to the New York state (NYS) Office of Parks, Recreation and Historic Preservation (OPRHP) Visitor Center at Little Stony Point.

#### Alignment No. 2

This route begins on sidewalks along West, Main, and Market Streets from Dockside Park to Lunn Terrace crossing Main Street at Depot Square. From Depot Square, the trail passes the Cold Spring Depot restaurant's parking and service areas before running at grade along the east side of MNR tracks, past the Cold Spring Public Works yard, wastewater treatment plant, and Mayor's Park and continuing onto the east side of the MNR causeway on an elevated structure. The route then traverses up to the west side of 9D adjacent to the NYS OPRHP building to Little Stony Point.

#### Alignment No. 3

This route begins on sidewalks along West, Main, and Market Streets from Dockside Park to Lunn Terrace, crossing Main Street at Depot Square and continuing through Depot Square past the Cold Spring Depot restaurant's parking and service area. It then parallels the MNR tracks on the east side between the Cold Spring Public Works yard, wastewater treatment plant, and Mayor's Park before heading east into Mayor's Park to Fair Street. On Fair Street, the route continues north to the intersection with 9D, at which point it follows the existing foot path to Little Stony Point.



#### Alignment No. 4

This route begins on sidewalks along West, Main, and Market Streets from Dockside Park to Lunn Terrace, continues east on Main Street, turning west onto Fair Street and continuing north on Fair Street to the intersection of 9D before transitioning to the existing foot path to Little Stony Point.

<u>Note</u>: Some trail users could bypass Market Street and Lunn Terrace by utilizing the access tunnel near Depot Square to Main Street east of the tracks, but this is not an accessible route.

#### Alignment No. 5

This route begins on sidewalks along West, Main, and Market Streets from Dockside Park to Lunn Terrace, continues east on Main Street to the intersection of Morris Avenue and 9D, turns west on Morris Avenue, continues to the Washburn parking lot, and crosses 9D at grade to access Little Stony Point.

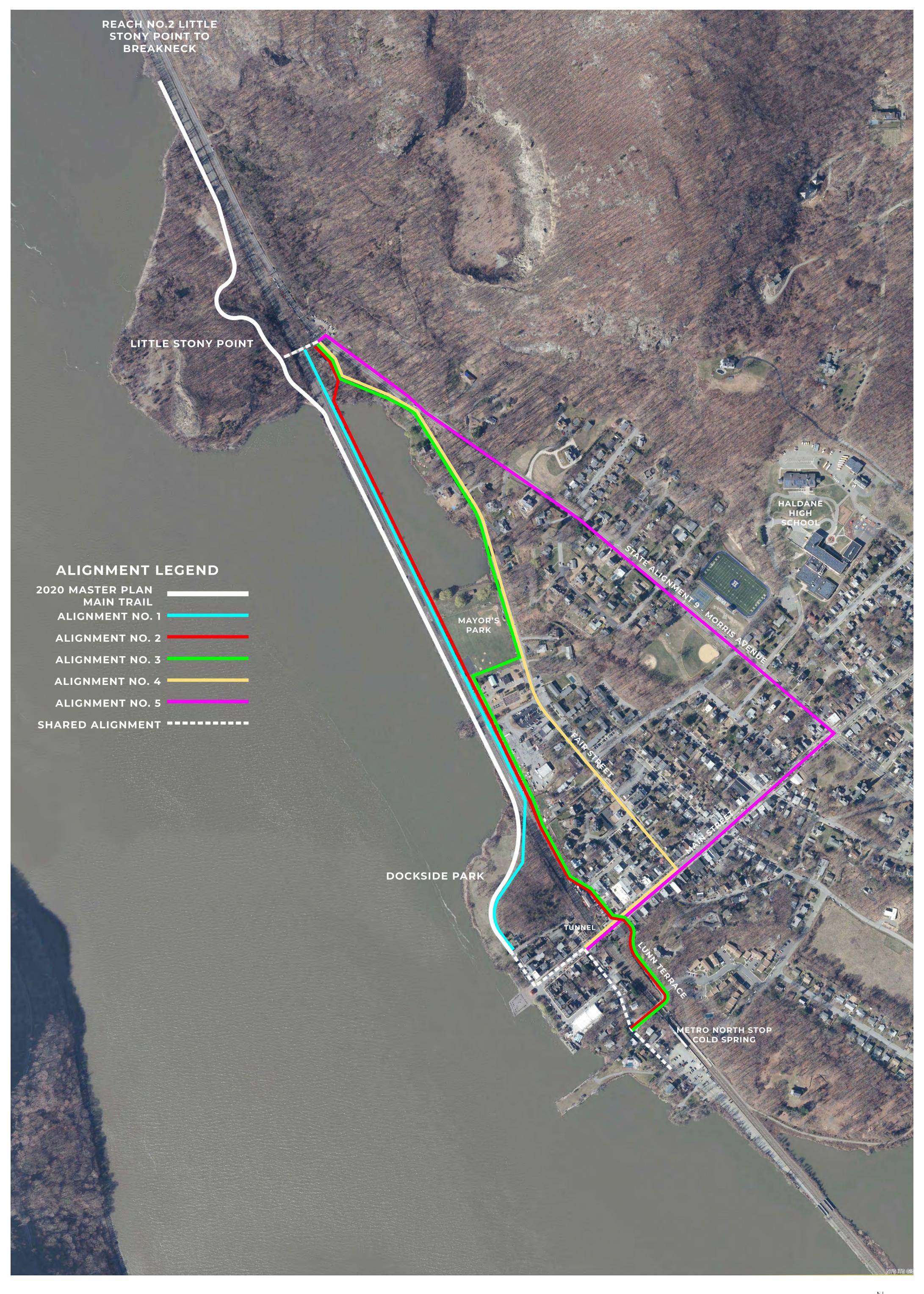
<u>Note</u>: Some trail users could bypass Market Street and Lunn Terrace by utilizing the access tunnel near Depot Square to Main Street east of the tracks, but this is not an accessible route.

#### **Shared Alignments**

Several of the alignments utilize the same route to reach key destinations. The plan sheets identify these as "Shared Alignment" to simplify the mapping and allow existing features to be visible.

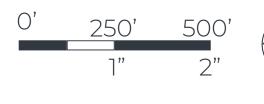
Alignments 2, 3, 4, and 5 begin at Dockside Park and traverse West Street, Main Street (west of tracks), Market Street, Lunn Terrace, and Main Street (east of tracks). It is impracticable to establish a separate multiuse trail facility along this stretch due to the established streetscapes and limited remaining right-of-way free of built features. The simplest solution would be to establish shared lanes for bicyclists and to have pedestrians use sidewalks where existing and provide sidewalks where they do not currently exist. As such, alignments that share this route would not meet several of the minimum criteria for the Main Trail performance.

These same alignments (Nos. 2, 3, 4, and 5) also share a route to reach Little Stony Point. The route includes improvements needed to create an accessible connection from 9D to the pedestrian bridge over the MNR tracks as identified in the 2020 Master Plan. This shared route is considered feasible and meets the performance goals for the Main Trail.





ALTERNATIVE ROUTING ANALYSIS
HUDSON HIGHLANDS FJORD TRAIL





Registration No. 083112

\*formerly known as Milone & MacBroom

Criteria	Maximum Category Score		Master Plan Main Trail	Alignment No. 1	Alignment No. 2	Alignment No. 3	Alignment No. 4	Alignment No. 5
Alignment Design – Alignments will be evaluated against desired width and clearances, inclusion of multi-modal users in a single facility, consistency of form and material, and resiliency goals.	5		5	5	3	2	2	1
Traffic & Safety – Prioritize alignments that are universally accessible, limit at-grade crossings of roads, intersections and driveways, improve safety along Route 9D, promote traffic calming, provide separation or buffers to vehicular travel ways, and enhance emergency response	5		4	4	3	2	1	1
Context - Prioritize alignments that offer the most scenic, ecological, and cultural experience of the Hudson Highlands while blending seamlessly into the surrounding environment	5	y Point	5	3	3	3	2	1
Connectivity - Prioritize alignments that foster connection to the visual and physical beauty of the Hudson Highlands landscape, ecology, and history	5	ittle Ston	5	4	4	3	2	1
<b>Diversity of Users</b> - Prioritize alignments that amplify universal accessibility, safety, and create a unique multimodal and recreational experience for all ages and abilities	5	Park to Li	5	5	4	4	3	2
Congestion Mangement - Prioritize alignments that manage access to popular destinations and sensitive sites, minimize negative impacts to community and environment, and promote new experiences, destinations, and narratives to explore	5	Dockside Park to Little Stony Point	5	4	3	3	2	1
Regional Support - Prioritize alignments that expand the region's recreational amenities, enhance access to existing or planned facilities, and have a high level of community support	5	Reach No. 1	4	4	2	2	2	2
Stewardship - Prioritize alignments that minimize impacts to the environment while promoting ecological processes, and preserving and enhancing the region's scenic beauty.	5	Re	4	3	2	2	3	1
Community – Prioritize alignments that minimize impacts to private property, utilities, limits the need for easements and acquisitions and disruption to community fabric	5		5	3	2	1	1	1
Implementation - Prioritize alignments that are feasible, sustainable, and cost effective with fewer design challenges and impacts to the community	5		2	1	1	2	2	1
Total Score	50		44	36	27	24	20	12
Ranking Per Reach			1	2	3	4	5	6



#### **REACH NO.1 – DOCKSIDE PARK TO LITTLE STONY POINT**

#### **7.1.2** Analysis and Rating Summary

This section provides an "at-a-glance" summary of the alignment ratings. For a full description of the alignments, refer to Section 7.1.3 Detailed Alignment Findings and Recommendations.

The highest achievable total score on the matrix is 55 points. The alignments for Reach No. 1 scored on a range from the low double digits to mid forties. Unfortunately, a majority of the alignments in this reach have significant enough obstacles to be deemed infeasible.

The Master Plan Alignment was determined to be the most advantageous alignment due to its straightforward route, limited property impacts, and potential to showcase and access the shoreline and surrounding landscapes. While the route requires extensive coordination with MNR and would be challenging to construct – more so than some other alignments – overall, the route scores high in most categories as it best fits the vision and performance criteria established.

Alignment No.1, while similar to the Master Plan Alignment, differs in a few key areas that resulted in a slightly lower score. These differences include the need to thread between the railroad tracks and the municipal wastewater treatment and public works yard — industrial uses with potential for large machinery, dust, noise, and odor. The alignment also requires a 200' bridge structure a minimum of 23' clear over the tracks that would create a visual impact for the nearby residential community's views to the river in both its structure and required clearing for construction. The bridge crossing also requires approval from MNR, who will scrutinize the crossing critically as any new crossing structures have to be planned carefully to not impede future rail plans for expansion or changes in use along the corridor. Since HHFT is already working to gain air right approvals for the Breakneck Connector crossing in Reach No. 3, it is less likely a second crossing will also be approved. If crossing the MNR tracks was approved, transitioning back to an at-grade trail within Dockside Park would require 400' of a sloped elevated structure, impacting the aesthetics of the park's eastern edge. Alignment No. 1 shares the complexities of the Master Plan route and adds to it further impacts to properties, community, and more extensive engineering and constructability, all resulting in a lower score than the Master Plan alignment.

Alignments No. 2 and No. 3 share much of their routes and, due to the private property impacts and user conflicts at the Cold Spring Depot Restaurant and adjacent to the MNR tracks, are not considered viable options even though they score higher than other alignments. If the routes overcame the ownership and operational impacts for the restaurant and MNR they still must contend with blasting and rock removal along the tracks and adjacent to residential properties. Both routes are considered less desirable due to issues of constructability including adhering to required MNR setbacks, interruption of rail service, and visual impacts from vegetation clearing. Overall, these routes have a diminished trail context and user experience as they thread a narrow passage at the restaurant, tracks, public works yard, and wastewater treatment plant.

Alignment No. 2 continues to Little Stony Point similar to Alignment No. 1, maintaining a consistent form and providing views to the river and tidal pond.



Alignment No. 3 diverges from the railroad tracks into Mayor's Park having to transition to a side path trail along Fair Street, impacting parking for the park as well as having to cross residential driveways. The Village has repeatedly stressed the need for the parking by the park and has strongly objected to any modification that would encumber or reduce parking in this area. The more circuitous routing and introduction of vehicular conflicts result in a lower score than Alignment No. 2.

Alignment No. 4 fails to provide the facility type of a Main Trail and requires traversing multiple local roads including Main Street to reach Dockside Park. Additional negative aspects of Alignment No. 4 include necessary easements or acquisitions of private property along much of the route, grading and removal of existing site features at residential property front yards, vocal community opposition, and issues with trail safety due to multiple road and driveway crossings. The trail also has limited shoreline access and increases the likelihood of congestion within the village center. This alignment would be better considered for a trail meander, which is defined in the Master Plan as pedestrian use only and not as wide as the Main Trail, to connect trail users to Mayor's Park and Main Street.

Implementation of Alignment No. 5 would require extensive impacts on the infrastructure of Main Street or separate facilities for cyclists and pedestrians. The HHFT's vision for the Main Trail is to provide a single facility for all users. A single facility is not achievable without removal of on-street parking or portions of the existing sidewalk, both of which are considered infeasible due to the negative impacts on the congested and compact village center, business access, and streetscape functionality. Given the narrow and busy roadway, even a separated facility approach with shared lanes for cyclists on Main Street would pose traffic and safety impacts. Once at the Main and Route 9D intersection, the alignment continues north on 9D and would impact on-street parking, front yards, and private property and would require construction of retaining walls along steep slopes. The alignment overall is considered to have a diminished context due to the route having no shoreline access, limited views, and reliance on paralleling vehicular routes. This alignment could be considered for a trail meander to connect trail users to Main Street, Haldane School fields, and the neighborhoods surrounding 9D.

Overall, Alignments No. 2, No. 3, and No. 5 are not considered feasible due to significant private property and community fabric impacts. Alignment No. 4 does not meet many of the project goals and has already had strong community opposition. Alignment No. 1 scores the highest and is similar to the Master Plan alignment, but the Alignment is contingent on MNR approval of the bridge spanning the tracks, and the added complexities of the route do not provide a net benefit to the project, community, or environment over the 2020 Master Plan Main Trail.

#### **REACH NO.1 – DOCKSIDE PARK TO LITTLE STONY POINT**

#### 7.1.3 Detailed Alignment Findings and Recommendations

For more information at a scale of 1"=100' including topography, spot grades, property lines, cross sections, and detailed callouts, refer to plan sheets 1 through 6 included in Appendix B of this report.

Based on the matrix criteria, the highest total score achievable is 55 points. The alignments scored in Reach No. 1 from highest to lowest are as follows:



- 2020 Master Plan Main Trail = 45 points
- Alignment No. 1 = 36 points
- Alignment No. 2 = 27 points
- Alignment No. 3 = 24 points
- Alignment No. 4 = 20 points
- Alignment No. 5 = 12 points

#### 2020 Master Plan Main Trail

The Master Plan indicates a shoreline alignment that takes users from at-grade, in Dockside Park, quickly to an elevated structure along the river's edge on the west side of the Metro-North causeway. Due to the narrow shelf, required rail clearances, and steep grade along the causeway, the trail is required to be elevated, which provides opportunities to improve resiliency, including being above the desired elevation of 8 feet for flooding as well as improving and strengthening the riprap edge of the causeway. As the trail travels north, it would need to rise approximately 28 feet over a distance of 560 feet to maintain a maximum 5% slope to reach the slopes on the southern end of Little Stony Point just west of the existing pedestrian bridge over the tracks.

The Master Plan alignment is straightforward in its path, allowing for a consistent route that keeps trail users on the correct path, facilitating those arriving by train in Cold Spring to quickly reach their destination without unnecessarily compounding congestion in the already-stressed village center. The trail has no transition between facility types, no vehicular intersections, or crossings and maintains a consistent width, allowing for a safe, accessible, and approachable trail alignment. The trail successfully connects two key destinations while providing a unique experience along a section of shoreline that would otherwise be inaccessible due to the railway use. Sweeping views of the Hudson River and surrounding landscape create an atmosphere full of potential for education, cultural highlights, and historic interpretation. The section of trail would likely be a destination unto itself given the potential for water access, views, and direct connectivity to popular local attractions.

The location of the route limits its negative impact on the community fabric by limiting impacts to only MNR property; however, views from a handful of homes on Fair Street would have a new elevated structure in their line of sight along the railroad causeway length.

While the route itself is straightforward, it would require extensive coordination with and approval by MNR as well as extensive design and construction detailing due to the length and scope of the elevated structure. Construction access would be difficult and again would require coordination with MNR.

#### Alignment No. 1

Alignment No. 1 is an off-road multiuse trail that requires extensive elevated structures and a bridge crossing to navigate the proposed route. The route parallels the east side of the MNR tracks and causeway linking the destinations of Dockside Park and Little Stony Point. The route can be accessible and accommodate all users safely while providing sweeping views of the Hudson River and surrounding landscape. Traversing the east side of the railroad does pose unique challenges, including spanning over the railroad tracks to access Dockside Park and threading the trail through the steep terrain and narrow corridor adjacent to the Cold Spring Wastewater Treatment Plant and Cold Spring Public Works yard.



Beginning at Dockside Park, the alignment needs to quickly transition to an elevated trail and begin gaining elevation over 400 linear feet within the park headed northeast toward the railroad, where an approximately 200-foot-long bridge structure would have to span over the tracks to the east side. The bridge would require a bottom chord elevation set no lower than elevation 38.0 to provide the required 23 feet of vertical clearance over the tracks that are at elevation 15.0. Approval and detailed coordination of the design for the bridge would be required by MNR as any new overhead structures have to be planned carefully to not impede future MNR plans for expansion or changes in use along the corridor. Since HHFT is already working to gain air rights for the Breakneck Connector crossing in Reach No. 3, this second potential crossing is viewed as less likely to be approved. Additional review and input from MNR is pending. If permission to build the bridge structure is not granted by MNR, this alignment would not be feasible. If the bridge is permitted by MNR, it could be a significant impact for the neighboring residential properties, creating a visual obtrusion from their properties to the Hudson River.

Continuing north, the trail would traverse parallel to the steep slope at the rear of the public works yard and wastewater treatment plant as an elevated structure for approximately 450 feet while dropping 28 feet in elevation to allow for the existing MNR at-grade access drive from Fair Street to remain. Over that distance the drop in elevation creates a trail gradient over 6%. If the MNR driveway access is relocated or abandoned a gentler trail slope could be accommodated. Fitting the alignment through this narrow corridor may impact existing infrastructure, particularly at the wastewater treatment plant. Views to the river would be expansive from the elevated viewpoint as would views into the much less scenic adjacent municipal facilities. As the trail descends in grade, it would remain an elevated structure adjacent to Mayor's Park and onto the causeway to traverse the narrow side slopes and maintain a height at or above elevation 8.

As the trail nears the northern terminus of the causeway, it would need to begin rising in elevation to reach the grade of the existing bridge to Little Stony Point. This would require a sloping elevated structure for approximately 400 feet at an 8 percent slope with required level landings. This assumes beginning at elevation 8 and reaching a maximum elevation of 36. To achieve a more desired 5 percent slope or less, the structure would need a minimum length of 600 feet.

Alignment No. 1 limits property impacts on Metro-North and municipal lots; however, there are visual impacts on surrounding residential properties from the Northern Gate development off Stone Road due to the proposed bridge crossing. The alignment alleviates congestion by routing trail users directly to Dockside Park and Little Stony Point without impacting Main Street and the surrounding neighborhoods as well as providing opportunities for ecological enhancements along the causeway shoreline. The route would provide a unique experience that could highlight the rugged character and scenic beauty of the surrounding landscape.

The alignment would require extensive structural design, coordination for construction access along the active railway, and detailed construction drawings and oversight of extensive elevated structures. Alignment No. 1 shares the complexities of the Main Trail route and adds to it further impacts on properties, community, and more extensive engineering and constructability, all resulting in a lower score than the Main Trail alignment.



#### Alignment No. 2

Alignment No. 2 travels the shared route from Dockside Park to Main Street before heading northwest to the east side of Depot Square. From there, it travels through the Cold Spring Depot Restaurant's parking lot and service area before having to parallel the railroad tracks. The restaurant's service area is private property and an operational space for deliveries and refuse storage/disposal. The area needs to function for the restaurant and is already limited by its shape and single access point. Threading the trail through this space is not considered safe or an appealing user experience. The space needed for the trail and buffer from vehicles maneuvering would infringe substantially on the area's functionality for the restaurant. The potential impacts on private property and business make this alignment undesirable and unfeasible without the property owner's approval.



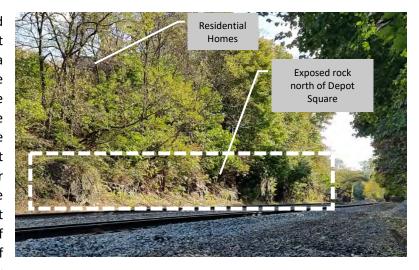
**Looking west to the Cold Spring Depot restaurant service yard** 



20



If the obstacle of the service yard were overcome, the alignment would then have to traverse an area of exposed rock and vertical rock face within MNR property. To parallel the tracks heading north and provide the required 25-foot MNR setback, the trail would have to be bench cut through approximately 450 linear feet of rock for the approximate dimensions of 10 feet wide by 12 feet tall, requiring the removal of approximately 2,000 cubic yards of rock and soil. Blasting, drilling or hammering to excavate the rock would be extremely difficult adjacent



to a high frequency rail corridor. While this area has been altered in the past to establish the rail corridor, the trail's construction would impact not only rail operations for a lengthy period, but also the neighboring residential properties located to the east. Vegetation removal and acoustics and vibrations if rock removal is allowed will produce both temporary and long-term impacts to the quality of live for the adjacent residential properties. Reducing the rock removal and pinning an elevated structure to the rock itself would require extensive geotechnical investigation beyond the scope of this study. While pinning is a potential option, rock removal and clearing of vegetation would still be required. In any scenario for the trail to traverse through this section of MNR property significant coordination would be needed for construction access, and lengthy interruption of the rail service for the eastern track would be necessary and unlikely to be granted by Metro-North. Additional review and input from MNR is pending.

After navigating through the rocky terrain, the trail would then transition to, or continue as, an elevated structure traversing the steep slopes at the rear of the Cold Spring public works yard and water treatment plant. The trail would remain an elevated structure adjacent to Mayor's Park and onto the causeway to traverse the narrow side slopes and maintain a height at or above elevation 8.

As the trail exits the causeway, it transitions onto the New York State parkland property and switchbacks up the existing slopes at a grade of 5 percent or less, finally reaching the shared path at the entry to Little Stony Point.

Alignment No. 2 severely impacts the private property of the Cold Spring Depot Restaurant as well as requires access within Metro-North property. The route would likely exacerbate congestion at the pulse point of Main Street and Depot Square and negatively impact the residential community above Depot Square and Stone Road.

The alignment would require extensive rock removal, structural design, coordination for access along the active railway, and construction of elevated structures. As stated earlier, this route is not considered feasible due to the property impacts and implementation costs; however, further discussions with the property owners and MNR will be explored to fully vet the option.



#### Alignment No. 3

Alignment No. 3 shares much of its routing with Alignments No. 2 and No. 4. The route travels the shared route from Dockside Park to Main Street before heading northwest to the east side of Depot Square; from there, it would travel through the Cold Spring Depot Restaurant's service area before having to navigate the vertical rock face between the service area and railroad tracks, continuing as an elevated structure to the rear of the Cold Spring public works yard and water treatment plant before entering Mayor's Park.



At Mayor's Park, the alignment would enter the park along the southern property line and continue to Fair Street where it would transition to a side path trail along the west side of Fair Street. This portion of the route would share the same route as Alignment No. 4 headed west to Little Stony Point.

Alignment No. 3 shares the same pitfalls as Alignment No. 2, including relying on private property access through the Cold Spring Restaurant service yard and significant rock removal within MNR property. This alignment is not considered a viable alternative; however, further discussions with the property owners will be explored to fully vet the option.



#### Alignment No. 4



**Fair Street looking east towards Main Street** 

Alignment No. 4 travels the shared route from Dockside Park to Main Street before heading north on the west side of Fair Street as an 8- to 10-foot-wide side path, eventually transitioning onto the New York State Parkland property as an on-grade multiuse path.

The Fair Street community has experienced firsthand the increased popularity of the local hiking trails, parks, and commercial areas, experiencing a sharp increase in vehicular and pedestrian traffic that has made the experience of Fair Street more of a "cut-through" street to access Main Street. The Fair Street side path alignment has been presented to the Village of Cold Spring in previous iterations of the HHFT planning process and received adamant opposition to the route due to concerns over quality-of-life impacts on the residential properties adjacent to and surrounding Fair Street. Past instances of local opposition include the November 14, 2016 Public Scoping Meeting for the trail as well as from citizen submitted comments gathered from approximately July to October 2016.

If implemented, this alignment would have to navigate a varying right-of-way width, which narrows from 75 feet to 40 feet wide at the southern end of Fair Street. The narrow right-of-way limits the opportunity to provide the desired trail width and buffer to the street for at least 400 linear feet heading from Main Street to the intersection with Cross Street. These constraints begin to lessen north of Cross Street and Northern Avenue as the right-of-way widens to 50 feet and buildings are set back further from the edge of the road or are less dense; however, front-yard impacts would continue the length of Fair Street. The alignment also raises concerns of pedestrian and vehicular conflicts due to the number of driveway crossings that typically have vehicles backing out. This concern grows when approaching the residences on the southern end of Fair Street, which have limited sight lines due to the proximity of neighboring buildings.

The west side of Fair Street was selected for the alignment because it avoids most utility poles, allows for more opportunity to buffer the trail, slightly reduces the number of intersection crossings, and allows for a



smoother transition to an off-road multiuse trail at the route's northern terminus near Little Stony Point. The west side alignment also provides direct access to Mayor's Park, the park's angled parking, and the municipal parking lot. The alignment does directly impact all three of these facilities, requiring reconstruction of the park's perimeter fence, removal of a minimum of ten angled parking spaces, and redesign of the municipal parking lot's entries, resulting in the removal of at least two center parking spaces.

As the route heads north past Mayor's Park, it must traverse the slopes adjacent to the tidal pond east of the MNR causeway, requiring the construction of a six-foot retaining wall or elevated structure for approximately 280 feet to stay at or above elevation 8 for sea level resiliency. Disturbance of the shoreline could allow for enhancements through invasive species management, revegetation with native species, and improving resilience by elevating the area above elevation 8. Currently, the area is 1-1.5 feet below elevation 8 for approximately 450 linear feet adjacent to the tidal pond and south along a portion of Mayor's Park, including Fair Street itself. It appears this area could be raised; however, this would affect the grades within the baseball field of Mayor's Park, requiring significant regrading and reconstruction of the field. If the field were left at existing grade, raising the road would require construction of a 2-3 foot retaining wall and modified pedestrian access into the park.

Beyond the tidal pond, the side path trail would traverse the right-of-way along the frontage of residential properties to the intersection of Fair Street and 9D, where it would transition to a multiuse trail through the New York State Parks property. As the trail exits Fair Street, the steep grades would need to be modified to better accommodate accessibility and may require a wall on the southwest side. The trail would continue up slope to the front of the New York State Parks building before utilizing the shared route to enter Little Stony Point.

The alignment provides access to Main Street businesses and Mayor's Park and connects the key destinations of Dockside Park and Little Stony Point but has limited interaction with the river itself and has had vocal community opposition. The alignment is unlikely to accommodate all trail users within one facility. It is likely that due to the narrow right-of-way, private property impacts, and reduced trail width that sections of the route would have to segregate pedestrians to sidewalks and cyclists to shared on-road facilities. The circuitous routing, multiple intersections and driveway crossings, and reduced width necessary at points are concerns for safety. Clear wayfinding and traffic signage would be a necessity. The trail experience is also diminished due to the limited right-of-way available; trail users would have no buffer to the vehicular traffic on Fair Street which further raises safety concerns for pedestrian/bicyclist and vehicular conflicts. Guardrails or other barriers may be needed help clearly delineate between trail and roadway; however, in some cases these barriers could impair sight distances, reduce trail width, or create hazards as fixed objects and should be evaluated carefully, if proposed. The alignment would also diminish the quality of life and privacy of the adjacent homes on Fair Street by infringing on driveways and front yards. At the southern end of Fair Street homes range from 30 feet to less than 10 feet from the edge of road.

The route directs traffic into the village center's busy Main Street area, creating more congestion due to intersection crossings, increased parking demand, and removal of parking in select areas. The route can provide greater exposure for local businesses but could also negatively impact parking and access, making it more difficult for business patron turnover. The project seeks to mitigate congestion to protect quality



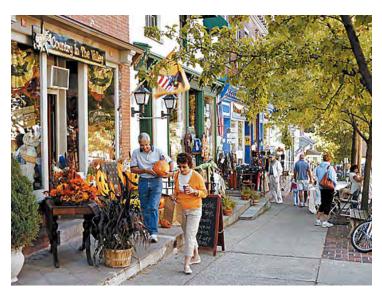
of life so routing the trail through the most congested area of the village is highly undesirable and counter to the project's purpose.

Alignment No. 4 minimizes environmental impacts by following an established right-of-way, utilizing areas of previous disturbance, and primarily avoiding sensitive resources and regulated areas; however, it provides limited opportunity for ecological enhancement or highlighting of the area's scenic beauty and would significantly impact the community fabric of Fair Street. Various private property impacts would be unavoidable, and the increased traffic along the trail route would be considered by many as a detriment to the neighborhood's quality of life. Street tree removals, particularly at the southern end of Fair Street, would remove the quaint character of the street creating a more urban-feeling streetscape that is incongruous with the town's character.

#### Alignment No. 5

Alignment No. 5 travels the shared route from Dockside Park to Main Street, continuing east on Main Street to State Route 9D. Routing the trail through the busy Main Street corridor is quite challenging. Creating a dedicated Main Trail facility along Main Street would require significant alterations of the roadway and streetscape. On-street parking on at least one side would have to be removed and the existing sidewalk reduced in width by a minimum of 2 feet. Removal of on-street parking is considered unlikely due to the lack of available nearby surface lot or garage parking facilities and the detrimental effect this would have on local businesses.

Pedestrians are well accommodated along the existing wide sidewalks on both sides of Main Street; therefore, any use of Main Street for the HHFT Main Trail should focus on better accommodations for bicycle traffic. The simplest and least impactful treatment would be to add shared-lane markings and signage for the length of Main Street. This would not impact parking, street trees, or sidewalks; however, shared lanes are not considered a safe option for inexperienced cyclists and would likely result in some cyclists using the sidewalk. Main Street is an already busy roadway with narrow travel lanes, on-street several parking and



**Main Street streetscape** 

intersections in a relatively short distance, concentrating cycling traffic along Main Street will increase the likelihood for vehicular and cyclist conflicts. Alternatively, separated bike lanes could be installed on both sides of the street and parking could remain, but this would result in significant loss of sidewalk area. Separated bike lanes require the removal of street trees and sidewalk amenity areas to accommodate the 3-foot striped buffer and 5-foot-wide bike lane, resulting in the removal of at least 8 feet from both sides of the streetscape. Such a significant change to the streetscape is not considered viable as the character of



Main Street is intrinsically tied to its wide sidewalks with outdoor eateries and sidewalk sales. The variation in storefronts and property access as well as sidewalk width would also not allow for a consistent final width of the walks if separate bike lanes were installed.

Whatever treatment is shown along Main Street, the alignment is anticipated to continue as a side path along the west side of Morris Avenue, State Route 9D, once it reaches the intersection of Main Street and Morris Avenue. To accommodate a 10-foot side path, modifications of the roadway would be necessary from the intersection of Main Street and Morris Avenue to Northern Avenue. The approximately 8-footwide shoulder/parking aisle would need to be reduced at a minimum to 4 feet wide but more than likely would need to be reduced to 2 feet wide to avoid permanent easements or acquisition of private property. All roadway alterations within the NYSDOT Right-of-Way would require NYSDOT coordination and approval including a Highway Work Permit (HWP).

North of Northern Avenue, Morris Avenue narrows by 5 feet, and the right-of-way widens by same distance, which helps to better accommodate the side path; however, challenges still persist. The trail would need to avoid the head-in parking along the Haldane High School athletic fields and would require an easement through the property. Continuing north, the side path would affect residential front yards including existing trees and hedges. Continuing the shoulder reduction through this area would help negate property impacts.

Further north, the grade of Morris Avenue begins to pitch to the north at an average slope of 8 percent down to the intersection with Fair Street. This section of Morris Avenue also has steep side slopes on both sides of the road. west side drops significantly and continuing the path would require a retaining wall ranging in height from 2 to 10 feet. Clearing of vegetation would also be required.



Morris Avenue, Route 9D, looking west near Haldane Street





The trail would then cross the Fair Street intersection at grade and continue along the west side of Route 9D, traversing the frontage of the NYS OPRHP property before reaching the shared path at the entry to Little Stony Point. The side path would need to be set back to avoid utility poles, which would aid in buffering the trail from the roadway but would require grading to provide a shelf for the trail that would be slightly depressed below the roadway. A 2–4-foot height retaining wall would be required along the eastern edge of the trail for approximately 200 feet. The addition of a guiderail along Route 9D would provide improved protection from the roadway.

While a side path route along Route 9D may fit the community fabric of Cold Spring better than Alignment No. 4 along Fair Street, the alterations required would impact private properties and the character of the streetscape. The route also fails to connect to the river and follows high-traffic roads, creating a less-than-unique trail user experience. Travelling alongside a state highway also significantly diminishes the trail experience while greatly raising the potential for pedestrian/bicyclist and vehicular conflicts. While vehicle speeds are reduced from 45 to 30 mph through this section of 9D, vehicles regularly exceed the posted limit, and the sheer volume of traffic greatly increases the potential for accidents. Minimal buffers between the road and trail cannot be implemented in most cases without removal of parking or paved shoulders and may still result in impacts on private properties.

The significant challenges Alignment No. 5 has related to connecting along Main Street would require broad community support and, beyond the addition of shared-lane markings, are viewed as not feasible.

#### 7.2 REACH NO. 2 – LITTLE STONY POINT TO BREAKNECK

#### 7.2.1 Alignment Descriptions

For more information at a scale of 1"=100' including topography, spot grades, property lines, cross sections, and detailed callouts, refer to plan sheets 7 through 12 included in Appendix C of this report.

#### 2020 Master Plan Main Trail

Beginning on grade at Little Stony Point, continue along the west side of the MNR railway primarily via an elevated structure to the lower overlook at Breakneck Ridge point where there is currently a small beach area. Traverse the western edge of the rock slope and shoreline before transitioning to Reach No. 3.

#### Alignment No. 6

Crossing from Little Stony Point to the east side of Route 9D, head north parallel to 9D as a side path until the approach to Breakneck Tunnel. As the alignment approaches the tunnel, transition to an elevated structure that continues to rise in grade above the tunnel as an elevated structure traversing the rock face of Breakneck Ridge. Continuing along the rock face, the trail remains above the railroad tracks and along the east face of the ridge connecting to the proposed Reach No. 3.

#### Alignment No. 7

Leaving Little Stony Point, continue along the west side of Route 9D (between 9D and railroad tracks) headed north as a side path and quickly transition to a slightly elevated structure above the existing drainage swale. As the area of land between Route 9D and the railroad tracks begins to widen, the



alignment veers northwest following the east side of the railroad tracks. Continuing north, the trail could transition to at-grade with the addition of fill or continue as a slightly elevated structure. Eventually, the alignment is required to become an elevated structure to span the railroad tracks via a bridge and connect to the Shared Alignment as a cantilevered structure along the exposed rock face eventually connecting to the proposed Reach No. 3.

#### Shared Alignments - Reach No. 2

Some alignments utilize shared routes to reach key destinations. The plan sheets identify these routes as "Shared Alignment" to simplify the mapping and allow existing features to be visible.

Alignments 6 and 7 share routes connecting to Little Stony Point and Breakneck Trailhead. At Little Stony Point, they share the improved accessible route from 9D and bridge crossing over the railroad tracks. At Breakneck, they share a portion of the cantilevered structure traversing the ridge's south and west rock faces prior to connecting to Reach No. 3.







# REACH NO.2 - LITTLE STONY POINT TO BREAKNECK

\*formerly known as Milone & MacBroom

Criteria	Maximum Category Score		Master Plan Main Trail	Alignment No. 1	Alignment No. 2	Alignment No. 3	Alignment No. 4	Alignment No. 5		Master Plan Main Trail	Alignment No. 6	Alignment No. 7
Alignment Design – Alignments will be evaluated against desired width and clearances, inclusion of multi-modal users in a single facility, consistency of form and material, and resiliency goals.	5		5	5	3	2	2	1		5	3	4
Traffic & Safety – Prioritize alignments that are universally accessible, limit at-grade crossings of roads, intersections and driveways, improve safety along Route 9D, promote traffic calming, provide separation or buffers to vehicular travel ways, and enhance emergency response	5		4	4	3	2	1	1		4	1	3
Context - Prioritize alignments that offer the most scenic, ecological, and cultural experience of the Hudson Highlands while blending seamlessly into the surrounding environment	5	y Point	5	3	3	3	2	1	Trailhead	5	2	3
Connectivity - Prioritize alignments that foster connection to the visual and physical beauty of the Hudson Highlands landscape, ecology, and history	5	Little Stony	5	4	4	3	2	1	Breackneck Tr	5	2	3
<b>Diversity of Users</b> - Prioritize alignments that amplify universal accessibility, safety, and create a unique multimodal and recreational experience for all ages and abilities	5	Park to Li	5	5	4	4	3	2	to	5	4	4
Congestion Mangement - Prioritize alignments that manage access to popular destinations and sensitive sites, minimize negative impacts to community and environment, and promote new experiences, destinations, and narratives to explore		Dockside Park to	5	4	3	3	2	1	Stony Point	5	2	3
Regional Support - Prioritize alignments that expand the region's recreational amenities, enhance access to existing or planned facilities, and have a high level of community support	5	Reach No. 1	4	4	2	2	2	2	Reach No. 2	5	2	2
Stewardship - Prioritize alignments that minimize impacts to the environment while promoting ecological processes, and preserving and enhancing the region's scenic beauty.	5	Re	4	3	2	2	3	1	Rec	4	2	2
<b>Community</b> – Prioritize alignments that minimize impacts to private property, utilities, limits the need for easements and acquisitions and disruption to community fabric	5		5	3	2	1	1	1		5	1	2
Implementation - Prioritize alignments that are feasible, sustainable, and cost effective with fewer design challenges and impacts to the community	5		2	1	1	2	2	1		2	1	1
Total Score	50		44	36	27	24	20	12		45	20	27
Ranking Per Reach			1	2	3	4	5	6		1	3	2



#### **REACH NO. 2 – LITTLE STONY POINT TO BREAKNECK**

#### 7.2.2 Analysis and Rating Summary

This section provides an "at-a-glance" summary of the alignment ratings. For a full description of the alignments, refer to Section 7.2.3 Detailed Alignment Findings and Recommendations.

Based on the matrix criteria, the highest total score achievable is 55 points. The alignments scored in Reach No. 2 from highest to lowest are:

- 2020 Master Plan Main Trail = 45 points
- Alignment No. 7 = 27 points
- Alignment No. 6 = 20 points

The 2020 Main Trail is the baseline rating against which to compare the other alignments to evaluate if they provide feasible and prudent alternatives. For Reach No. 2, the Master Plan Main Trail alignment was found to be the most advantageous alignment due to its straightforward route, limited property impacts, and potential to showcase and access the shoreline and surrounding landscapes. While the route requires extensive coordination with MNR and would be challenging to construct, overall, the route scores high in most categories as it best fits the vision and performance criteria established.

Both Alignments 6 and 7 have considerable challenges. Implementation of the routes would require extensive structures, alterations to infrastructure, and impacts on the geologic form of Breakneck Ridge. Both alignments would require extensive coordination with MNR and NYSDOT as each affect existing infrastructure for both parties. The overall user experience of both alignments is considerably less than the 2020 Main Trail due to their distance from the shoreline and close proximity to Route 9D. Alignment 6 scores particularly low due to the long distance it follows Route 9D. These alternative alignments do not provide a net benefit to the project, community, or environment over the 2020 Master Plan Main Trail and are not recommended as prudent alternatives.

#### **REACH NO. 2 -LITTLE STONY POINT TO BREAKNECK**

#### 7.2.3 Detailed Alignment Findings and Recommendations

For more information at a scale of 1"=100' including topography, spot grades, property lines, cross sections, and detailed callouts, refer to plan sheets 7 through 12 included in Appendix C of this report.

#### 2020 Master Plan Main Trail

The Master Plan Alignment continues from Little Stony Point to the west side of the train tracks quickly transitioning from an at-grade trail to an elevated structure following the Hudson River shoreline for the remainder of the route. An elevated structure is necessary due to the limited space of shoreline between the tracks and the Hudson River and to achieve the targeted elevation of 8 feet for the Master Plan alignment. As the alignment leaves Little Stony Point and parallels the MNR railroad, it is able to maintain 25 feet clear from the centerline of the west tracks for the entirety of its length per MNR requirements. Typically, an 8' high fence would separate trail users from the tracks. The design team strives to minimize

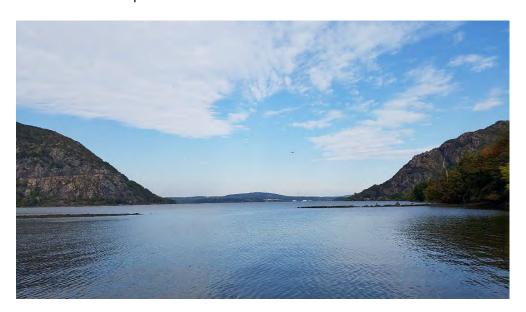


impacts to the shoreline and in-water construction of the trail, as such trail width would be reduced to 10' clear between safety rails of the elevated structure. Along the alignment, existing MNR infrastructure would necessitate the trail to bow out into the water for a short distance to provide a minimum of 6-foot clearance around the facility. The crossing of Breakneck Brook culvert may also require the trail to place "feet" into the water.

Two design options are being explored near the trail's northern terminus at Breakneck Ridge to provide access to an overlook area and key experiential space along the banks of the river and toe of the ridge. One option would touch down at grade while the other would maintain a slightly elevated structure. Both would provide stepped access to the shoreline and an on-grade connection at the southern point of Breakneck Ridge before transitioning to Reach 3 – Breakneck Connector at the NYS Department of Environmental Conservation property and drainage chamber.

The Master Plan Main Trail alignment strives to follow the shoreline with the trail structure landward of the river's edge to the extent possible and simultaneously parallel the MNR railroad tracks providing adequate horizontal clearances. Ongoing coordination with MNR would continue to vet the alignment's location and impact on existing infrastructure, culvert crossings, and required clearance distances. The trail would reduce in width from 14 feet to 10 feet as a general rule for the shoreline trail to accommodate clearances and navigate site constraints to lessen impacts.

Other impacts related to this alignment include clearing of vegetation along the shoreline. Trees and scrub shrubs of various conditions and desirability inhabit the landscape. The trail would be routed, particularly at its south end, to avoid mature and desirable vegetation to the extent possible. Constructing along the shoreline would provide the opportunity to strengthen eroded sections, remove invasive vegetation, and improve the resiliency of the railway. The alignment would provide expansive views of the river and surrounding highlands as well as provide opportunities for direct water access. The route is entirely removed from vehicular traffic and has no road or driveway crossings. Property impacts are limited to MNR and NYS Parks parcels.



**View north to Storm King Mountain and Breakneck Ridge** 



While the design of the 2020 Master Plan Trail alignment would need to be detailed extensively and construction would be difficult, the unique experience created far surpasses the other options within this reach, which also require extensive engineering and costly construction and result in greater physical and visual impacts.

# Alignment No. 6

Alignment No. 6 would be a side path trail along the eastern shoulder of Route 9D for the majority of its length and would require users to cross 9D at grade to access Little Stony Point and the preferred HHFT trail alignment to Cold Spring. The alignment north of the Brook Trailhead would need to transition to an elevated structure. The structure is needed to raise the alignment's elevation to span over the commercial and residential driveways prior to Breakneck Tunnel and then navigate the rock face of the ridge as a cantilevered structure. The route poses several unique challenges and would significantly impact existing infrastructure, viewsheds, geologic forms, and private property.

The shoulder area of Route 9D alone presents several challenges due to limited width, infrastructure, exposed rock, and steep side slopes. The shoulder is vegetated and averages approximately 8 feet wide; however, several existing structures and utilities interrupt that width throughout the route. Beginning at the Washburn parking lot, utility poles exist within the shoulder for the first 3,500 linear feet of the alignment. Once the utility poles transition to the west side of 9D, the alignment continues to contend with periodic guy poles supporting the main utility poles on the west side of the road north and south of the Brook Trailhead. For a main trail route to traverse the shoulder, significant infrastructure relocations and drainage improvements would be necessary. In conjunction, regrading and construction of retaining walls would be required to accommodate even a reduced trail width of 8 feet.





**Existing Infrastructure along Route 9D east shoulder** 

Due to the narrow width of the shoulder and steep slopes rising to the east for much of the alignment, the grade would have to be cut and retaining walls or exposed rock face constructed to maintain an acceptable trail width of 10 feet minimum. An additional minimum 2-foot shoulder would be necessary along the road edge to provide a buffer and area to install a protective guardrail. Ideally, this buffer would be 5 feet wide.

Adding to the challenges of utilizing the shoulder is the fact that the area serves as drainage infrastructure for Route 9D. The shoulder is graded as a depressed swale intercepting runoff from Route 9D and the adjacent eastern slopes. The runoff is captured and then directed to a series of drainage structures and culverts located within the shoulder. The shoulder is a critical piece of low-impact infrastructure



protecting Route 9D and the railroad tracks from becoming inundated during storm events while providing stormwater capture, mitigation, and infiltration.

It is not considered feasible to regrade the roadway of 9D to capture runoff prior to the shoulder, so the trail would have to allow for the capture and transfer of runoff under the trail surface via a series of structures and pipes. The new drainage system would connect to existing culverts under route 9D conveying runoff to the west side between 9D and the train tracks. Currently, the vegetated swale removes sediment, heavy metals, and pollutants from the runoff and aids in reducing water volume and temperature, acting as a pretreatment for stormwater. If collected in structures and conveyed via pipes, the runoff would have significantly less pretreatment and higher volumes resulting in more pollutants potentially reaching the river. The system can be designed with a permeable trail surface and base with perforated underdrains, but this requires careful engineering and would create a more complex and costly drainage system than existing conditions. All roadway alterations within the NYSDOT Right-of-Way would require NYSDOT coordination and approval including a Highway Work Permit (HWP).

As the alignment approaches the Brook Trailhead and Breakneck Ridge, the shoulder typically narrows further and drops off in grade to the east. A structure to cross Breakneck Brook would be required, and as the trail continues north, it would have to transition to an elevated structure. Due to the trail's location on the east side of Route 9D, it must cross to the west and navigate over Route 9, the railroad tracks, and rock face of Breakneck Ridge. To reach an elevation adequate to cross along the rock face above Breakneck Tunnel and



**Culvert at Breakneck Brook east side of Route 9D** 

maintain a manageable running slope of 5 percent, the trail must begin to rise in elevation approximately 1,000 linear feet prior to the tunnel entrance. This length also accommodates spanning over the commercial and residential driveways adjacent to the tunnel. The construction of this alignment impacts the private properties within this area. The commercial property would need to redesign its driveway entrance and remove parking from along its frontage. Grading and temporary rights would be needed to construct the alignment, and the finished installation would create a visual impact to the neighboring properties and overall appearance of the Route 9 corridor in this area.

The greatest impact associated with this alignment would be attaching a trail structure to Breakneck Ridge. Altering significant geologic formations does not align with the project goals or the State Coastal Consistency Policy regarding scenic quality and irreversible modifications of geologic forms. Breakneck Ridge and tunnel are iconic locations, and the views to them from the south and west (via Storm King Mountain) would be affected by this alignment's construction. The structure would have to slope along the face to eventually make a transition to the Main Trail alignment. The design and construction costs associated with a structure attached to the rock face would be significant, if permitted. The structure



would also be a permanent physical and visual alteration of Breakneck Ridge particularly as viewed from the river and surrounding Highlands. This alteration would likely be viewed by many as diminishing the natural beauty of the ridge, a signature landscape feature of the entire Hudson Highlands and half of the Highlands "Wind" Gate (with Storm King Mountain).

The overall experience of this alignment would be paralleling the state highway. Route 9D is a major thoroughfare with vehicle speeds regularly exceeding the posted speed limit of 55 mph. Walking along the shoulder is currently an unpleasant and unnerving experience. Without significant alterations to the shoulder, the proposed alignment, while slightly improved, would still be in close proximity to the noise and speeds of passing high-speed traffic creating a less than peaceful or scenic experience. The route pulls users away from the shoreline providing no direct physical access to the river or foreshore and would only provide limited views of the river and surrounding landscape. During most of the year, vegetation along the shoreline would obscure any view from the alignment to the river. The elevated trail would be a unique experience that could provide interesting views particularly from the rock face looking south but at significant construction cost and permanent alteration of a significant natural feature. However, this alignment's overall experience, when considering the related costs and impacts on existing infrastructure as well as when weighed against other potential route options, is not considered beneficial to the HHFT vision or surrounding community fabric.

### Alignment No. 7

Alignment No. 7 shares several similarities with Alignment 6 and in so doing shares similar challenges. Paralleling two active transportation corridors also creates challenges unique to this alignment. After exiting Little Stony Point, Alignment No. 7 begins as a side path on the west side of Route 9D but quickly would need to transition to an elevated structure. Throughout this section, the alignment parallels Route 9D within the narrow land between 9D to the east and the railroad tracks to the west that is typically utilized as a shallow drainage way. On average, this space between the outer edge of the tracks' ballast stone and western edge of Route 9D is approximately 15 feet wide with little to no buildable shoulder. The MNR clear zone of 25 feet from the centerline of track typically leaves 8 feet or less within which to implement the trail. The trail itself, and corresponding protective measures, needed particularly for safety from the tracks, would require coordination with MNR and approval with an agreed-upon clear zone.

The approximately 15-foot-wide vegetated drainage way, similar to the eastside shoulder for Alignment No. 6, is utilized as critical drainage infrastructure. In many areas because it is wider and also accepting more runoff than the east side of the road, it is graded as a deeper depression. There are several concrete headwall structures as well as areas of standing water as the runoff from both the tracks and



**Drainage way between MNR tracks and Route 9D** 



Route 9D is collected. One such area is a flagged wetland approximately 1,400 square feet in size. The area is vegetated primarily with herbaceous plants and periodic single or small tree clusters. The most common plant present is the invasive plant species Mugwort (*Artemsia*). Any construction occurring within this space could provide an opportunity for invasive species removal and establishment of native species.

Construction of the alignment within this space is assumed as an elevated structure, possibly as a center pier boardwalk, to allow current drainage to continue unimpeded. The elevation and trail surface would directly affect shading of the ground below. To allow adequate light and space for vegetation to grow, the trail should be at least 4 feet above. If disturbed for trail construction, the area could be further improved for water collection and treatment. Filling the space or constructing retaining walls, while possible, was considered a detriment to the area and would need to be studied in more detail to understand the impacts on surface runoff, drainage, and wildlife movement.

As the alignment heads north, the space between the two transportation corridors (highway and railroad) begins to widen. The trail alignment would follow the east side of the rail corridor outside the required MNR clear zone. This pulls the route away from Route 9D, improving the user experience. While avoiding 9D and its steep side slopes, this area of land is low lying with large areas of surface water including tidally influenced pools and associated wetlands. The area has a significant watershed directly fed by Breakneck Brook to the east and is tidally influenced via an existing culvert connecting to the Hudson River. The capacity of these low areas and wetlands is critical to mitigating the more frequent severe storm events and will become more strained as sea levels rise. Any proposed alterations including the potential for added drainage infrastructure would need an in-depth hydrologic analysis.



Route 9D looking north at Breakneck Ridge and tunnel



As the trail diverges from 9D, the existing topography is generally at elevation 6 necessitating either fill or an elevated structure to be at or above the target elevation of 8. If fill is placed, it would require approximately 1,400 cubic yards of material and the removal of vegetation along the edges of flagged wetlands for approximately 1,500 linear feet. In select areas, small boulder retaining walls could be needed to ensure no direct wetland impact occurs. As the trail continues to head north, it eventually would be required to transition to an elevated structure and continue as one sloped at no more than 5 percent for approximately 600 linear feet to rise in grade to eventually reach an elevation able to cross above the tracks at the minimum required 23-foot vertical clearance. A bridge structure would then take trail users west over the tracks and transition to the Shared Alignment along the west rock face of Breakneck Ridge.

While this alignment improves upon the trail experience and somewhat lessens the complexity of design and construction compared to alignment no. 6, it still requires disturbance of significant drainage infrastructure, requires extensive elevated structures, impacts the geologic formation of and views to breakneck ridge, and parallels a highly trafficked state highway. The associated costs and impacts of the alignment coupled with a diminished user experience, in comparison to the 2020 master plan main trail, require this alignment to be rated lower and not considered to be a prudent alternate route.

# 7.3 REACH NO. 3 – BREAKNECK CONNECTOR

# 7.3.1 Alignment Description

For more information at a scale of 1"=100' including topography, spot grades, property lines, cross sections, and detailed callouts, refer to plan sheets 13 and 14 included in Appendix D of this report.

Reach No. 3 only contains one route for evaluation.

### **Breakneck Connector**

The Breakneck Connector reach includes a bridge structure that crosses the MNR railway linking the Breakneck trailhead and the proposed parking and train station improvement to the shoreline. After crossing the Breakneck Connector bridge, the Main Trail continues as an elevated structure before transitioning to an at-grade trail with intermittent elevated structure crossings to traverse wetlands and drainage channels within the land between Route 9D and the railroad tracks heading north before transitioning to Reach No. 4 just prior to the MNR pedestrian bridge crossing.

# 7.3.2 Detailed Alignment Findings and Recommendations

The area between Breakneck Ridge Trailhead and the Breakneck Metro-North Station is one of the most concentrated areas of use along the potential trail route. Thousands of hikers arrive via train, car, bike, and on foot to access Breakneck Ridge. With limited parking, no defined walking paths, and the typical daily traffic on Route 9D, congestion and safety issues abound. The 2015 master plan efforts identified this area as a critical project and slated it to be one of the first constructed, developing full construction plans and bidding the project several times. The bids received each time were above the available funding,



and the project was put on hold. The 2020 planning effort has reexamined this area and made modifications to align the improvements to the current vision and goals of the updated master plan, but the ultimate goal of greater safety, convenience, and resiliency remains.



**Conceptual Design Image of Breakneck Connector** 

The Breakneck Connector reach includes a bridge structure that crosses the MNR railway linking the Breakneck trailhead and the proposed parking and train station improvement to the shoreline. Alignments in Reach Nos. 2 and 4 would rely on the Breakneck Connector bridge to continue the trail route regardless of which alignment is chosen in each reach. After crossing the Breakneck Connector bridge, the Main Trail continues as an elevated structure before transitioning to an at-grade trail with intermittent elevated structure crossings to traverse wetlands and drainage channels within the land between Route 9D and the railroad tracks.

The Breakneck Connector area will also include parking and access improvements through both dedicated parking lots and parallel pull-off spaces. Additional improvements to crosswalks, drainage, and comfort stations in the area are also envisioned. The Breakneck Connector is still regarded as the initial phase construction project for the Hudson Highland Fjord Trail.

# 7.4 REACH NO. 4 – BREAKNECK CONNECTOR TO BEACON

# 7.4.1 Alignment Descriptions

For more information at a scale of 1"=100' including topography, spot grades, property lines, cross sections, and detailed callouts, refer to plan sheets 14 through 26 included in Appendix D of this report.

# 2020 Master Plan Main Trail

Continuing north from the Breakneck Connector, the Main Trail navigates through the land between Route 9D and the railroad past the MNR pedestrian bridge before diverging east along higher terrain to



the rear of both state and private properties. The alignment continues off road and along rugged terrain until reaching Fishkill Creek. At the creek, the route turns east following the creek along a utility easement until crossing the creek via a new pedestrian bridge connecting to the existing trail west of the former Tioronda Hat Factory. Following the existing trail for a short distance, the alignment then switchbacks upgrade to reach the former rail spur and follows the spur over the MNR tracks and onto Dennings Point. The alignment then follows the existing Klara Sauer Trail to reach Long Dock Park.

# Alignment No. 8

Continuing north from the Breakneck Connector, Alignment No. 8 would share the Main Trail route to where Route 9D begins to veer east away from the Hudson. The alignment would then continue as a side path along the west side of Route 9D until reaching Grandview Avenue, continuing as a side path along the north side of Grandview Avenue before veering onto South Avenue and crossing Fishkill Creek via the former Tioronda Bridge to reach Madam Brett Park. Heading west, the route would follow the existing boardwalk along the north side of Fishkill Creek and onto the existing connector trail sharing the remainder of the alignment with the 2020 Main Trail along the former rail spur and existing Klara Sauer Trail to Long Dock Park.

### **Route Options**

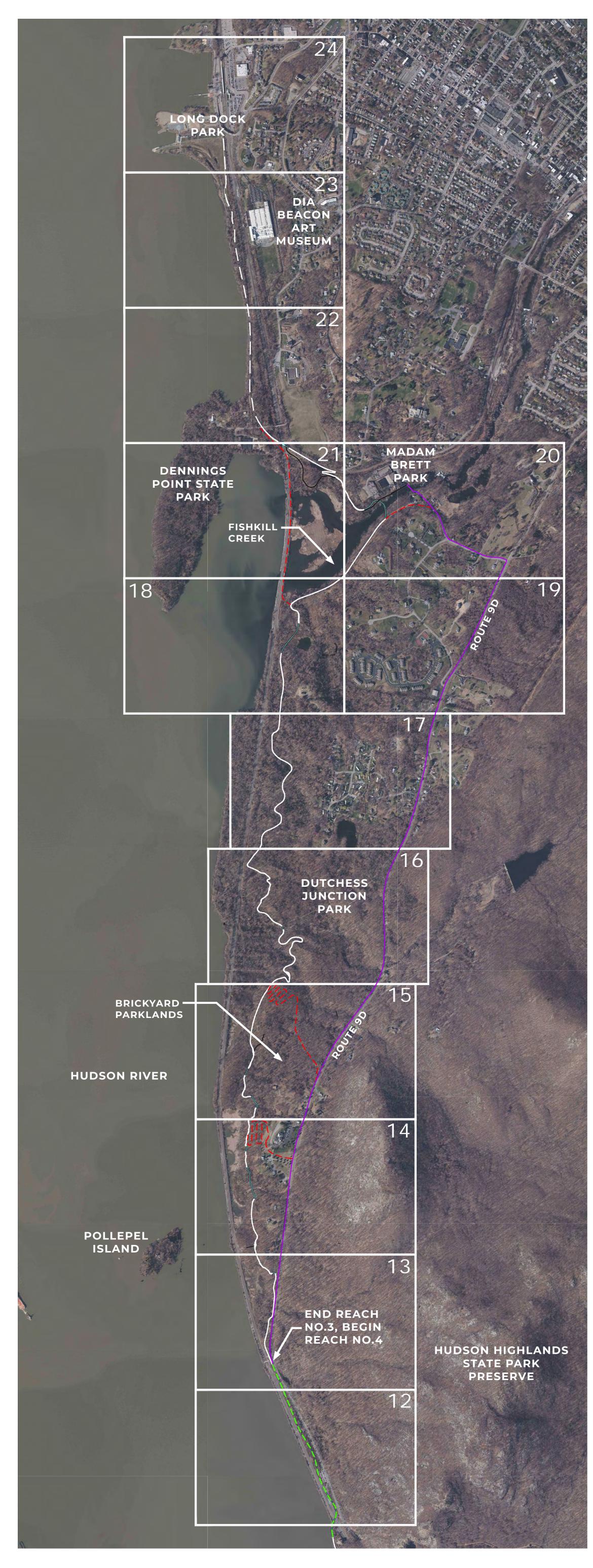
Reach No. 4 contains several optional spur routes that were identified as possible alternate segments, allowing for varied alignments while still utilizing the majority of either the Main Trail or Alignment No. 8. The options identified are as follows:

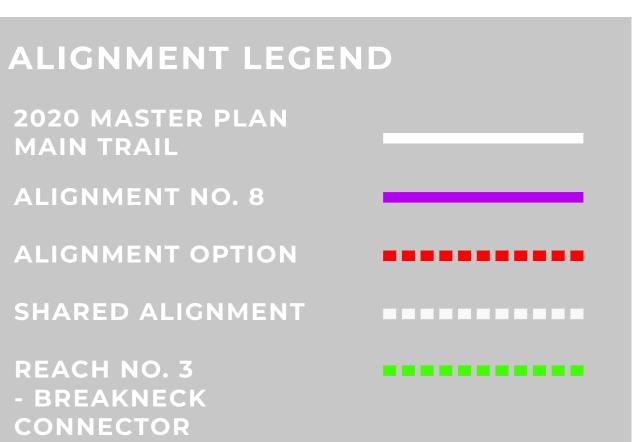
Route Option #1 — heading west from Alignment 8 between the Dutchess Manor and the residential property owned by Hudson Highlands Fjord Trail Inc., traversing the steep slopes via a series of switchbacks to connect to the Main Trail alignment at the rear of the Dutchess Manor property.

Route Option #2 – beginning at the southeast corner of the Brickyard Parkland property heading northwest from Alignment 8 until reaching the steep grades south of Wades Brook and traversing the steep slopes via a series of switchbacks to connect to the Main Trail alignment before crossing the brook.

Route Option #3 – upon reaching Fishkill Creek via the Main Trail alignment diverging west onto the MNR Causeway to reach Dennings Point, rejoining the Main Trail alignment at the existing Klara Sauer Trail. Note: This option is included for informational purposes only. MNR has indicated no support for utilizing the causeway at this location.

Route Option #4 – continuing east instead of crossing Fishkill Creek along the utility easement and through private properties to reach South Avenue and Alignment 8.







# REACH NO.3 - BREAKNECK CONNECTOR TO BEACON



Criteria	Maximum Category Score		Master Plan Main Trail	Alignment No. 1	Alignment No. 2	Alignment No. 3	Alignment No. 4	Alignment No. 5		Master Plan Main Trail	Alignment No. 6	Alignment No. 7		Breakneck Connector		Master Plan Main Trail	Alignment No. 8	Route Option 1	Route Option 2	Route Option 3	Route Option 4	
Alignment Design – Alignments will be evaluated against desired width and clearances, inclusion of multi-modal users in a single facility, consistency of form and material, and resiliency goals.	5		5	5	3	2	2	1		5	3	4		5		5	1	4	4			
Traffic & Safety – Prioritize alignments that are universally accessible, limit at-grade crossings of roads, intersections and driveways, improve safety along Route 9D, promote traffic calming, provide separation or buffers to vehicular travel ways, and enhance emergency response	5		4	4 4 3 2	2	1	1		4	1	3		5	5	4	1	5	s orth Railroad	lorth Railroad			
Context - Prioritize alignments that offer the most scenic, ecological, and cultural experience of the Hudson Highlands while blending seamlessly into the surrounding environment	5	y Point	5 <b>3 3 2</b>	1	ailhead	5	2	3		4	sacon	4	2	4	4	r - Metro N	mpacts					
Connectivity - Prioritize alignments that foster connection to the visual and physical beauty of the Hudson Highlands landscape, ecology, and history	5	tle Ston	5	4	4	3	2	1	ckneck Tra	5	2	3	Connecto	5	ctor to Be	5	2	4	4	erty Owne	Property I	
Diversity of Users - Prioritize alignments that amplify universal accessibility, safety, and create a unique multimodal and recreational experience for all ages and abilities	5	Park to Lit	5	5	4	4	3	2	t to Brea	5	4	4	ackneck (	5	ck Conne	4	2	4	4	rivate Prop	To Private	
Congestion Mangement - Prioritize alignments that manage access to popular destinations and sensitive sites, minimize negative impacts to community and environment, and promote new experiences, destinations, and narratives to explore	5	Dockside	ŏ	5	4	3	3	2	1	Stony Poin	5	2	3	No.3 Bre	5	Breackne	3	1	4	4	Concerns of P	d Feasible Due
Regional Support - Prioritize alignments that expand the region's recreational amenities, enhance access to existing or planned facilities, and have a high level of community support	. 5	Reach No. 1	4	4	2	2	2	2	Reach No. 2	5	2	2	Reach No.	5	Reach No. 4	3	2	4	4	sible Due To	ot Considere	
Stewardship - Prioritize alignments that minimize impacts to the environment while promoting ecological processes, and preserving and enhancing the region's scenic beauty.	5	Rec	4	3	2	2	3	1	Rea	4	2	2		4	- <u>«</u>	3	4	1	1	idered Fea	Not	
Community – Prioritize alignments that minimize impacts to private property, utilities, limits the need for easements and acquisitions and disruption to community fabric	5		5	3	2	1	1	1		5	1	2		5		3	1	4	4	Not Cons		
Implementation - Prioritize alignments that are feasible, sustainable, and cost effective with fewer design challenges and impacts to the community	5		2	1	1	2	2	1		2	1	1		3		2	2	1	1			
Total Score Ranking Per Reach			44	36	27	24	20	12		45	20	27		46 n/a		36	18	35 n/a	35 n/a			



# **REACH NO. 4 – BREAKNECK CONNECTOR TO BEACON**

# 7.4.2 Analysis and Rating Summary

This section provides an "at-a-glance" summary of the alignment ratings. For a full description of the alignments, refer to Section 7.4.3 Detailed Alignment Findings and Recommendations.

Based on the matrix criteria, the highest total score achievable is 55 points. The alignments scored in Reach No. 4 from highest to lowest are as follows:

- 2020 Master Plan Main Trail = 36 points
- Alignment No. 8 = 18 points

Route options are not fully connected alignments and only provide spur trail connectivity between the 2020 Main Trail and Alignment No. 8. While rated, their scores do not reflect a feasible alternative route in its entirety and should only be used to evaluate route options against one another.

- o Route Option #1 = 35 points
- o Route Option #2 = 35 points
- o Route Option #3 = Not scored, deemed infeasible
- o Route Option #4 = Not scored, deemed infeasible

The 2020 Main Trail is the baseline rating against which to compare the other alignments to evaluate if they provide feasible and prudent alternatives. For Reach No. 4, the Master Plan Main Trail alignment was found to be the most advantageous alignment primarily due to user experience and context. The Main Trail in Reach No. 4 is the most challenging out of the four reaches due to the topography the alignment traverses and the potential for private property impacts. Despite these challenges, the Main Trail still outperforms Alignment No. 8. in most categories as it best fits the vision and majority of the performance criteria established.

Alignment No. 8 has considerable challenges, including alterations of existing road and utility infrastructure, private property impacts, and extensive coordination with NYSDOT. The overall user experience is considerably less than the 2020 Main Trail due to its proximity to Route 9D. Alignment 8 scores particularly low due to the long distance it follows Route 9D with limited buffering, numerous driveway and road crossings, and the considerable topographic challenges due to the lack of a graded shoulder and steep drop-off adjacent to much of the route. Alignment No. 8 does not provide a net benefit to the trail experience or community over the 2020 Master Plan Main Trail and is not recommended as a prudent alternative.

Route Option #1 is considered a viable alternative as it does not impact private property; however, it does require extensive grading to traverse the steep slopes at the rear of Dutchess Manor, resulting in vegetation removal and the potential for erosion issues. Clearing could allow for the removal of areas of undesirable and invasive vegetation and establishment of more desirable species. The location provides potential shared parking when events are not scheduled at Dutchess Manor, but this usage could be viewed as a negative impact by the nearby residential properties. The route is viewed as a more beneficial option to Alignment 8 than the Main Trail.



Route Option #2 is considered a viable alternative as it does not impact private property; however, it does require extensive grading to traverse the steep slopes within the Brickyard Parkland property. The trail construction would result in removal of vegetation over an approximate area of 4 acres and create the potential for erosion issues due to the steep slopes. Clearing could allow for the removal of areas of undesirable or invasive vegetation and establishment of more desirable species. The route is viewed as a more beneficial option to Alignment 8 than to the Main Trail.

Route Option #3 is not considered a viable alternative and is included only for informational purposes. The route has been evaluated during previous planning phases, and MNR has expressed no support to use the causeway in this location for the trail.

Route Option #4 is not considered a viable option due to the impacts on the residential properties and difficulty to reach grade at South Avenue without impacting the residential driveway. Property owners in this area have been vocal in opposition to this trail route.

### **REACH NO. 4 – BREAKNECK CONNECTOR TO BEACON**

# 7.4.3 Detailed Alignment Findings and Recommendations

For more information at a scale of 1"=100' including topography, spot grades, property lines, cross sections, and detailed callouts, refer to plan sheets 14 through 26 included in Appendix D of this report.

# 2020 Main Trail

Proceeding from Breakneck Connector, the Main Trail continues up slope along the triangular piece of land between the tracks and Route 9D as the state highway veers to the east. The area is topographically challenging as the grade rises sharply from the road edge to the MNR pedestrian bridge.



View looking north on west shoulder of Route 9D



Once at the top elevation of the embankment, the Main Trail continues north, meandering above the wetlands and tracks to the west. The alignment then veers northwest, avoiding a private residential property before requiring access rights to cross four private properties in a row. Continuing north, two properties have easement rights acquired, and two are owned by Hudson Highlands Fjord Trail Inc., including the Dutchess Manor property. North of the Dutchess Manor, there are four additional private properties that will require easements before the alignment enters the State's Brickland Parklands and Dutchess Junction Park properties, allowing access to Fishkill Creek. While not requiring private easement rights, this route traverses rugged topography and is near and crosses wetland areas, particularly just south of Fishkill Creek.

Once reaching the north end of the state park's property, utilizing a utility easement the alignment makes its way east along the upper banks of Fishkill Creek before crossing the creek via a bridge and elevated structure west of the former Tioronda Hat Factory. Here the alignment connects to the existing park trail for a short distance before the Main Trail switchbacks up the slope between the existing trail and the former railroad spur to the north. The alignment then follows the former rail spur toward Dennings Point State Park utilizing the existing railroad bridge over the active MNR tracks below. The rail bridge will require modifications for trail users. The alignment then continues primarily along the existing Klara Sauer Trail to reach Long Dock Park. All existing trail routes utilized will require reconstruction or modification to some extent to accommodate the desired trail widths and elevations. The Klara Sauer Trail will require modifications to raise the trail's grade to or above Elevation 8.



View looking north to the Klara Sauer Trail at Dennings Avenue

The Reach No. 4 Main Trail is entirely off road travelling along the rear of multiple properties between the railroad tracks to the west and Route 9D to the east. This reach of the Main Trail is more remote and does not directly connect to the shoreline but rather navigates the rugged wooded terrain above the shoreline and railroad tracks for much of its length. Reaching the Dutchess Junction Park property the trail begins



to level off and maintain an elevation close to existing grade. The Main Trail alignment provides off-road opportunities to connect to regional destinations such as MNR stations, Dutchess Manor, Brickyard Parklands, Dutchess Junction Park, Madam Brett Park, Dennings Point State Park, and Long Dock Park; however, its route must traverse steep terrain within forested areas for long distances. While the trail would be routed to avoid mature and desirable vegetation, construction will require tree and understory removal; however much of the understory in this area is colonized by undesirable or invasive species. Working within the steep topography and adjacent to sensitive habitats will require well-thought-out and detailed plans to mitigate the potential for impacts. Planned uses of elevated structures and cross culverts will help mitigate disturbing large areas of terrain; while trail routing will consider proximity to sensitive habitat areas such as wetlands, watercourses, bald eagle nesting sites, and upland forests, through distance, establishing desired plantings, and screening. Particular attention will be given to the nesting sites and timing of construction.

The opportunity to introduce trail users to this rugged and varied terrain will provide a unique experience and highlight a different context of the Hudson Highlands over the other reaches, but it also presents unique challenges and potential impacts. While the route traverses state parkland and Scenic Hudson-owned properties or easements where possible, there is the potential for at least eight private residential properties that the trail would need to cross. The existing state and HHFT properties, including Dutchess Manor and the Notch (Dutchess Junction Park), provide potential access points along the corridor for temporary haul roads during construction as well as permanent emergency access that will be required due to the remote nature of this reach. The steep topography, again, will make temporary and permanent access difficult and will require well-thought-out and detailed engineering plans to mitigate potential negative impacts.



View looking west to the Hudson River from the wooded hillside behind Dutchess Manor

•



Similar to other reaches, the Main Trail alignment is entirely removed from vehicular traffic and has no road or driveway crossings, providing increased safety and attractiveness to less-experienced trail users. The alignment has challenges to overcome, particularly due to topography and related construction of the trail requiring extensive engineering and costly construction means and methods. The forested landscape presents the opportunity for education, enhancement, and stewardship of areas that protect the Hudson River and define the Highlands. Designed smartly and sensitively, the Main Trail alignment's construction impact can be mitigated to a large extent. Alignment No. 8 will likely have a more difficult time mitigating the traffic safety concerns inherent to its route.

# Alignment No. 8

Leaving Reach No. 3 Breakneck Connector, Alignment No. 8 heads east along the west side of Route 9D and immediately is challenged with existing utility poles, a narrow road shoulder, and steep rock embankment for approximately 225 feet. As the embankment lessens, the potential for a graded shoulder is short lived as the topography then drops off sharply to the west, and the presence of utility poles persists.



Looking north at the limited shoulder along the west side of Route 9D

Approaching Hartsook Lane, the shoulder levels off slightly but is also used as a drainage conveyance for road runoff. Shortly thereafter, another steep embankment exists for approximately 200 feet before a berm and graded lawn swale appears as the alignment traverses the fronts of residential properties and the commercial property of Dutchess Manor. The overhead wires and utility poles shift to the east side of Route 9D just prior to the Dutchess Manor; however, the lawn swale and other appurtenances such as stone walls and buffer plantings along the residential properties persist until reaching the Brickyard Parklands. At the Brickyards Parkland property, the utility poles return to the west side, and the



topography again drops sharply to the west, leaving little room for a graded shoulder. The alignment will need retaining walls for the majority of the alignment as it heads north along the parklands and Dutchess Junction Park properties. Elevated structures will also be required to cross at least three locations, including Wades Brook, Gordons Brook, and a drainage outfall prior to Wades Brook.

North of Dutchess Junction Park, the alignment again traverses the frontage of residential properties north and south of Stratus Road. Limited shoulder, steep drop-offs, no right-of-way, and multiple driveways and parking areas complicate adding a multiuse trail through this area. The steep topography persists as the alignment continues north until finally reaching Grandview Avenue, where the trail heads west on the north side of Grandview to South Avenue. At the end of South Avenue, the trail would cross Fishkill Creek over the former Tioronda Bridge connecting to Madam Brett Park and the existing boardwalk on the north side of the creek. Alignment No. 8 would take advantage of the existing boardwalk to connect to the existing park trail and then follow the same route as the 2020 Master Plan alignment to Dennings Point and beyond to Long Dock Park.



**Existing Boardwalk at Madam Brett Park** 

Alignment No. 8 has significant challenges to overcome to install a multiuse trail along Route 9D for the 2.5-mile length it parallels the state highway. In preliminary reviews NYSDOT has indicated additional buffering from the roadway would be required in this area due to vehicular speeds however in many areas there is limited to no additional right-of-way. The additional obstacle of utility poles for much of the route creates a de facto buffer to the road but also complicates grading as it pushes the trail downslope away from the road. The poles are approximately 4 feet from the back of the metal beam guardrail and 6 to 8 feet from the road's edge. Providing a minimum of 2 feet clear from the poles makes the nearest trail edge a minimum of 8 feet from the edge of road. In many locations, 8 feet horizontally from the road is



greater than a 4-foot vertical difference. Filling to create a level surface for the trail will require walls and graded slopes. In other areas, embankments, rockface, stonewalls, and other residential improvements are less than 10 feet from the edge of road. Further complicating construction along the west side of Route 9D is that the paved roadway is located closer to the western right-of-way limits. Earlier planning efforts evaluated the reconstruction of the roadway to push the southbound lane east to the approximate location of the northbound lane and then create a bike lane with a separated walking trail. This would require significant engineering and construction, including blasting of the stone ledge, and does not provide a single, safe, multiuse facility for all trail users. The geographic information system (GIS) and aerial mapping available indicate areas of no shoulder outside the western edge of the roadway to build the trail alignment without private property impacts, permanent easements, or takings. Field survey of the right-of-way would better determine if it would be feasible to fit the alignment on the western side without roadway modifications and to determine the extent of property impacts if this alignment were pursued.



Limited shoulder and existing features along Route 9D

Alignment No. 8 follows a high-traffic road. Travelling alongside the state highway with posted speeds of 45 and 55 mph diminishes the trail experience significantly while greatly raising the potential for pedestrian/bicyclist and vehicular conflicts. The high volume of traffic also increases the potential for accidents. The number of blind curves, driveway crossings, and unsignalized road crossings with which the alignment would have to contend greatly reduces its likelihood as a prudent alternative route. The fact that Alignment No. 8 follows an established travel corridor does reduce its impact on the surrounding forested areas. The addition of the multiuse trail to the corridor will likely have little additional detrimental effect to wildlife or vegetative communities along the corridor; however, areas along the



alignment would need significant tree clearing and earthwork to accommodate the alignment due to the limited shoulder and steep adjacent topography.

While Alignment No. 8 requires less mitigation efforts than the Main Trail, its context and traffic safety concerns coupled with constructability and property issues reduce the alignment's feasibility below that of the 2020 Main Trail alignment.

# Route Options Nos. 1 and 2

Route Options Nos. 1 and 2 are considered feasible alternatives for Alignment No. 8 to diverge from following Route 9D and lessen the issues associated with following the state highway noted above. Each optional route requires substantial grading to reach the Main Trail alignment, resulting in additional clearing and disturbance in the forested upland. Unfortunately, utilizing either of these routes would not remove all adjacent private property impacts; it would simply move the impact from the front yard to the backyard. The property impacts and overall length of the trail and area of disturbance needed to traverse the steep grades make these optional routes not considered prudent alternatives. Each route could be considered for a trail meander to connect the Main Trail to the regional attractions of Dutchess Manor and Brickyard Parklands.



# 8. ALTERNATIVES ANALYSIS SUMMARY

The Hudson Highland Fjord Trail between the village of Cold Spring and the city of Beacon is an ambitious and precedent-setting planned 7.5-mile experience along the Hudson River and surrounding Highland's landscape. The trail's potential to connect key destinations and provide a truly unique experience is directly linked to where the trail is implemented on the ground. Having to potentially navigate currently inaccessible shorelines, rugged forested terrain, active rail corridors, state highways, and busy village centers provides no shortage of obstacles to overcome.

This alternative analysis study reviewed previous and current planning efforts to determine prudent and feasible routes for the project's main trail alignment using the Scenic Hudson's 2020 HHFT Master Plan's adopted Main Trail route as the current baseline and preferred alignment. All alternative alignments were rated and analyzed individually and then compared against each other and the preferred Main Trail to determine which, if any, were equal to or surpassed the Main Trail in feasibility and performance.

Performance criteria were again set per the adopted 2020 Master Plan, which created the unique vision for the fjord trail. Of the identified eight potential alternative alignments, none reached a level that demonstrated a clear advantage over the 2020 Main Trail alignment. Several alignments have challenges that proved insurmountable, relegating those routes to low scoring and removal from the list of optional routes. Most times, these challenges focused on private property access, constructability, or safety, in some cases all three. While it was found that the Main Trail also suffered from the above challenges, in most cases progress had been shown in current planning, design, and property or regulatory agency coordination, making the defined 2020 route still more achievable than the other alignments.

A key factor in the overall evaluation of the alignments was the context of the trail. Several alternative alignments required the trail to parallel roads. In many cases, the road was state highway Route 9D. Constructing a side path trail typically presents challenges. Due to the rugged topography, existing utility infrastructure, varying right-of-way, and long distances, the side path alignment options between Cold Spring and Beacon would be particularly difficult to implement. Any on-road or side path options also have inherent safety risks due to the increased likelihood of vehicular and pedestrian or bicyclist collisions. These optional routes were no different and, in all cases, resulted in lower scoring than the offroad 2020 Main Trail.

It is understood that ongoing design, planning, and environmental evaluations will continue to be conducted as HHFT progresses toward implementation. The result of this alternatives analysis is that the 2020 Main Trail, while challenging and costly to construct, has been deemed to provide the most user-friendly, consistent, resilient, safe, scenic, connected, and community-supported alignment of the routes identified.

142.17391.00001.0050.au2021.rpt.docx



# **LIMITATIONS**

The services described in this work product were performed in accordance with generally accepted professional consulting principles and practices. No other representations or warranties, expressed or implied, are made. These services were performed consistent with our agreement with our client. This work product is intended solely for the use and information of our client unless otherwise noted. Any reliance on this work product by a third party is at such party's sole risk.

Opinions and recommendations contained in this work product are based on conditions that existed at the time the services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. The data reported and the findings, observations, and conclusions expressed are limited by the scope of work. We are not responsible for the impacts of any changes in standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others or the use of segregated portions of this work product.

The purpose of this assessment is to reasonably evaluate the potential for, or actual impact of, constructing the trail alignments identified. It is understood that a balance must be struck between a reasonable inquiry effort and an appropriate level of analysis for each conceivable issue of potential concern.

No investigation was undertaken to exclude the presence of hazardous materials within the project limits. If hazardous conditions have not been identified during the assessment, such a finding should not therefore be construed as a guarantee of the absence of such materials on the site, but rather as the result of the services performed within the scope, practical limitations, and cost of the work performed.

The passage of time, manifestation of latent conditions, or occurrence of future events may require further study at the site, analysis of the data, and/or reevaluation of the findings, observations, and conclusions in the work product.

This work product presents professional opinions and findings of a technical nature. The work product shall not be construed to offer legal opinion or representations as to the requirements of, or the compliance with, environmental laws, rules, regulations, or policies of federal, state, or local governmental agencies.



# **APPENDIX A**

# **DECISION MATRIX CATEGORY SCORING CRITERIA & RESULTS**

# **Alternative Alignments Analysis**

Hudson Highlands Fjord Trail, Inc. One Civic Center Plaza, Suite 200 Poughkeepsie, NY 12601

February 2022

# **Decision Matrix Category Scoring Criteria Summary**

# Alignment Type

- 5 = Alignment is a single multi-modal facility consistent throughout route and meets all target widths, clearances, and is at or above elevation 8
- 3-4 = Alignment is a single multi-modal facility consistent throughout the majority of the route and meeting minimum target width, clearances, and is at or above elevation 8
- 1-2 = Alignment utilizes more than one facility type, with required width, clearances, and elevations potentially not met

# Traffic & Safety

- 5 = Alignment has no at-grade crossings, and is separated from vehicular traffic
- 3-4 = Alignment has limited at-grade crossings, and is separated from vehicular traffic
- 1-2 = Alignment has many at-grade crossings, and limited or no buffer from vehicular traffic

### Context

- 5 = Entire alignment has a high quality of user experience and does not follow a vehicular right-of-way
- 3-4 = Majority of alignment has a high quality of user experience; a portion of the route may follow a vehicular right-of-way with a posted speed limit less of 25mph or less
- 1-2 = Lack of user experience with potential for some users to feel uncomfortable or excluded

### Connectivity

- 5 = Alignment results in the connection of targeted destinations while providing direct access to the waterfront
- 3-4 = Alignment results in the connection of targeted destinations with limited waterfront access
- 1-2 = Alignment does not result in the connection of targeted destinations or provides no waterfront access

### **Diversity of users**

- 5 = Alignment is universally accessible and maintains a consistent facility type throughout the route
- 3-4 = Alignment is universally accessible but transitions between one or more facility types throughout the route
- 1-2 = Alignment has limited accessibility, utilizes separate facility types for users, or could be uncomfortable for potential users

### **Congestion Management**

- 5 = Alignment reduces visitation at pulse points by providing alternative destinations, controls traffic onto sensitive sites, and promotes unique user experiences
- 3-4 = Alignment slightly reduces visitation at pulse points by providing limited alternative destinations, limited control of traffic onto sensitive sites, and relatively familiar user experiences
- 1-2 = Alignment exacerbates potential congestion by not providing alternative destinations, directing traffic onto main thoroughfares (pedestrian or vehicular), or sensitive sites

# **Regional Support**

- 5 = Alignment expands regional trail networks and recreational opportunities and has high level of community support
- 3-4 = Alignment supports growth of regional trail networks and recreational opportunities and has a majority community support
- 1-2 = Alignment has limited growth potential or compatibility with regional trail networks and recreational opportunities, or low community support

# **Stewardship**

- 5 = Alignment avoids, protects, and enhances ecological, cultural, and social resources
- 3-4 = Alignment has limited impacts to environment, private property and community fabric while mitigating all impacts to the extent feasible
- 1-2 = Alignment has significant impacts to environment while mitigating a limited amount or none of the impacts

# Community

- 5 = Alignment utilizes public lands with little to no impact to private property or community fabric
- 3-4 = Alignment has limited private property and community fabric while mitigating all impacts to the extent feasible
- 1-2 = Alignment has significant impacts to private property and community fabric while mitigating a limited amount or none of the impacts

# <u>Implementation</u>

- 5 = Alignment construction is straightforward, utilizes best practices and materials, with little to no impact on the community
- 3-4 = Construction has limited challenges and will create minor impact on the community
- 1-2 = Construction has significant challenges and impacts on the community.

Criteria	Maximum Category Score		Master Plan Main Trail	Alignment No. 1	Alignment No. 2	Alignment No. 3	Alignment No. 4	Alignment No. 5		Master Plan Main Trail	Alignment No. 6	Alignment No. 7		Breakneck Connector		Master Plan Main Trail	Alignment No. 8	Route Option 1	Route Option 2	Route Option 3	Route Option 4	
Alignment Design – Alignments will be evaluated against desired width and clearances, inclusion of multi-modal users in a single facility, consistency of form and material, and resiliency goals.	5		5	5	3	2	2	1		5	3	4		5		5	1	4	4			
Traffic & Safety – Prioritize alignments that are universally accessible, limit at-grade crossings of roads, intersections and driveways, improve safety along Route 9D, promote traffic calming, provide separation or buffers to vehicular travel ways, and enhance emergency response	5		4	4 4 3 2	2	1	1		4	1	3		5	5	4	1	5	s orth Railroad	lorth Railroad			
Context - Prioritize alignments that offer the most scenic, ecological, and cultural experience of the Hudson Highlands while blending seamlessly into the surrounding environment	5	y Point	5 <b>3 3 2</b>	1	ailhead	5	2	3		4	sacon	4	2	4	4	r - Metro N	mpacts					
Connectivity - Prioritize alignments that foster connection to the visual and physical beauty of the Hudson Highlands landscape, ecology, and history	5	tle Ston	5	4	4	3	2	1	ckneck Tra	5	2	3	Connecto	5	ctor to Be	5	2	4	4	erty Owne	Property I	
Diversity of Users - Prioritize alignments that amplify universal accessibility, safety, and create a unique multimodal and recreational experience for all ages and abilities	5	Park to Lit	5	5	4	4	3	2	t to Brea	5	4	4	ackneck (	5	ck Conne	4	2	4	4	rivate Prop	To Private	
Congestion Mangement - Prioritize alignments that manage access to popular destinations and sensitive sites, minimize negative impacts to community and environment, and promote new experiences, destinations, and narratives to explore	5	Dockside	ŏ	5	4	3	3	2	1	Stony Poin	5	2	3	No.3 Bre	5	Breackne	3	1	4	4	Concerns of P	d Feasible Due
Regional Support - Prioritize alignments that expand the region's recreational amenities, enhance access to existing or planned facilities, and have a high level of community support	. 5	Reach No. 1	4	4	2	2	2	2	Reach No. 2	5	2	2	Reach No.	5	Reach No. 4	3	2	4	4	sible Due To	ot Considere	
Stewardship - Prioritize alignments that minimize impacts to the environment while promoting ecological processes, and preserving and enhancing the region's scenic beauty.	5	Rec	4	3	2	2	3	1	Rea	4	2	2		4	- <u>«</u>	3	4	1	1	idered Fea	Not	
Community – Prioritize alignments that minimize impacts to private property, utilities, limits the need for easements and acquisitions and disruption to community fabric	5		5	3	2	1	1	1		5	1	2		5		3	1	4	4	Not Cons		
Implementation - Prioritize alignments that are feasible, sustainable, and cost effective with fewer design challenges and impacts to the community	5		2	1	1	2	2	1		2	1	1		3		2	2	1	1			
Total Score Ranking Per Reach			44	36	27	24	20	12		45	20	27		46 n/a		36	18	35 n/a	35 n/a			



# **APPENDIX B**

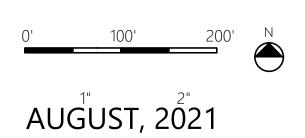
# **ALIGNMENT PLANS AND SECTIONS - REACH NO. 1**

# **Alternative Alignments Analysis**

Hudson Highlands Fjord Trail, Inc. One Civic Center Plaza, Suite 200 Poughkeepsie, NY 12601

February 2022



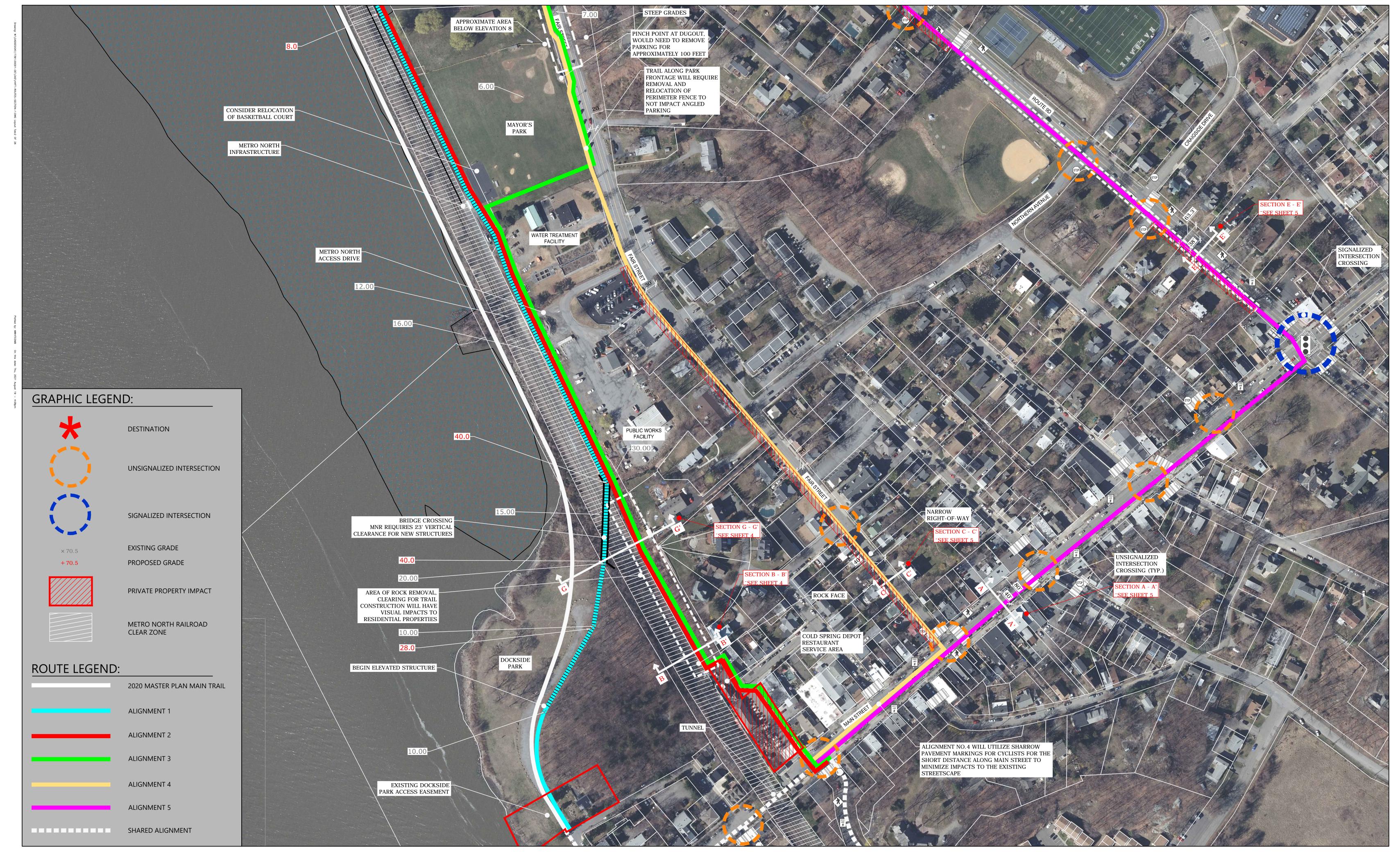


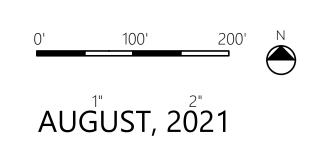
HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
DOCKSIDE PARK TO LITTLE STONY POINT

SHEET 1 OF 26

231 MAIN STREET, SUITE 102
NEW PALTZ, NY 12561
845.633.8153
WWW.MMINC.COM | SLRCONSULTING.COM

SLR Engineering, Landscape Architecture, and Land Surveying P.C.
Registration No. 083112



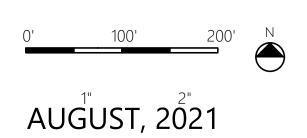


HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
DOCKSIDE PARK TO LITTLE STONY POINT

SHEET 2 OF 26

231 MAIN STREET, SUITE 102
NEW PALTZ, NY 12561
845.633.8153
WWW.MMINC.COM | SLRCONSULTING.COM

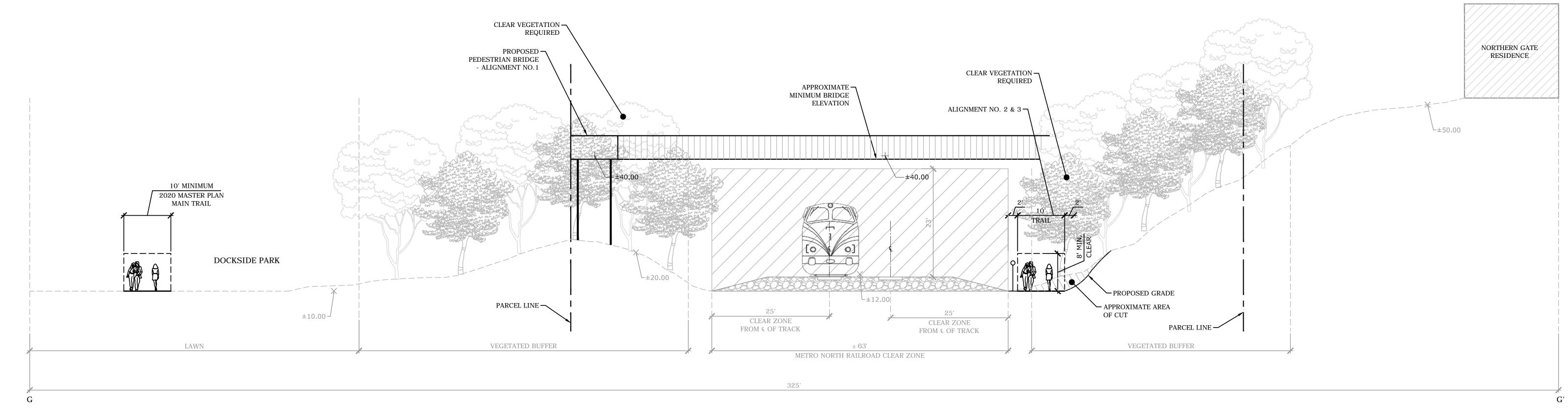




HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
DOCKSIDE PARK TO LITTLE STONY POINT

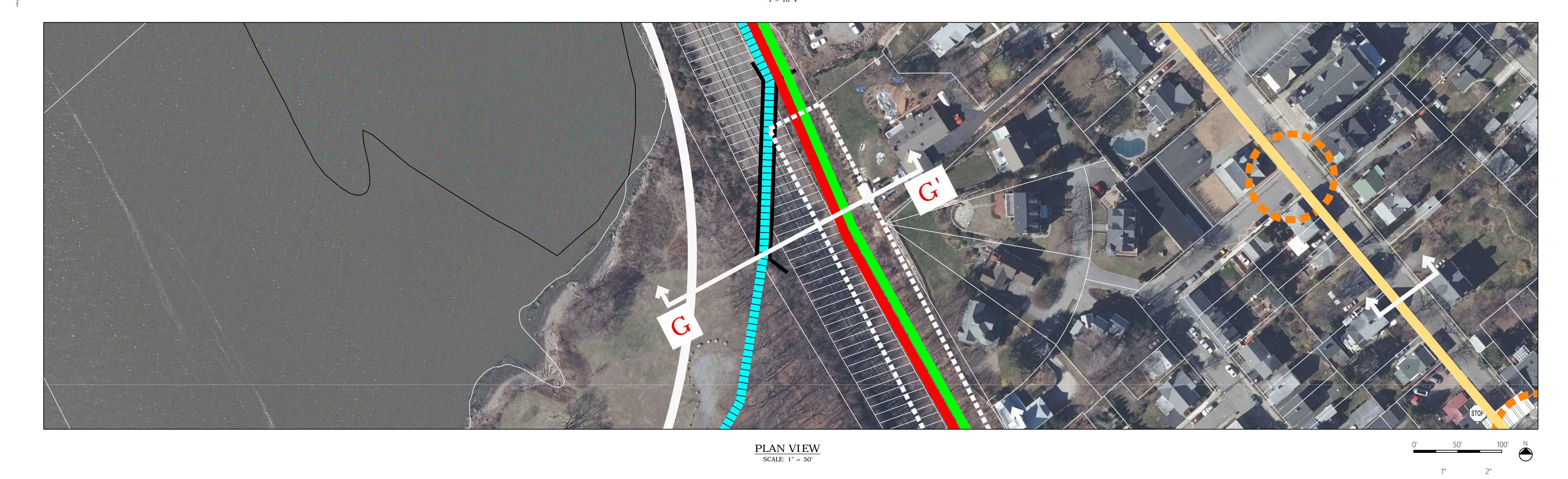
SHEET 3 OF 26

231 MAIN STREET, SUITE 102
NEW PALTZ, NY 12561
845.633.8153
WWW.MMINC.COM | SLRCONSULTING.COM



ALIGNMENT NO. 1, 2 & 3
PROFILE VIEW: G - G'
RAILROAD TRACKS

1"= 10' H
1"= 10' V



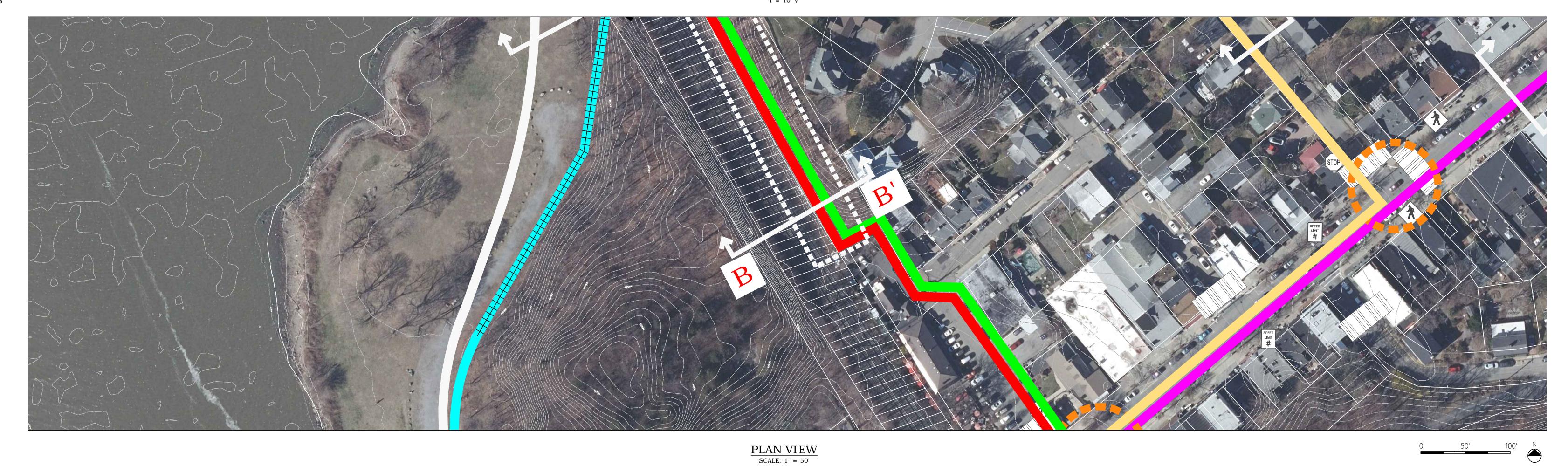
HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
DOCKSIDE PARK TO LITTLE STONY POINT

SHEET 4 OF 26



ALIGNMENT NO. 2 & 3
PROFILE VIEW: B - B'
RAILROAD TRACKS

1"= 10' H
1"= 10' V

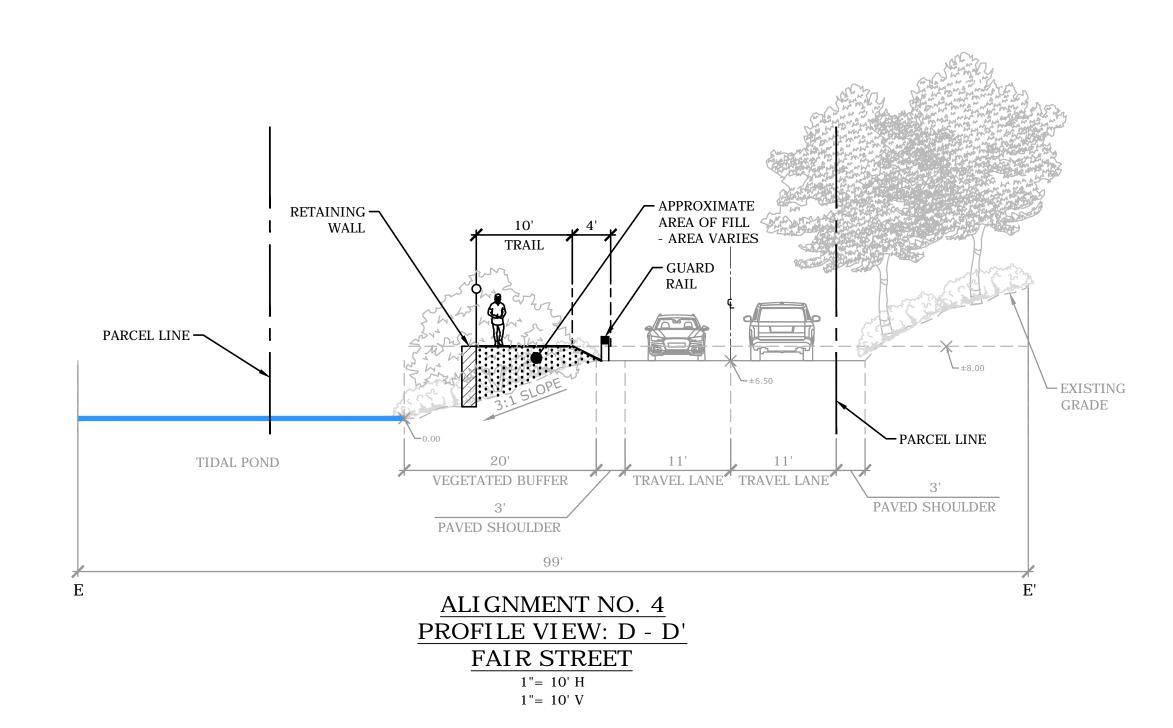


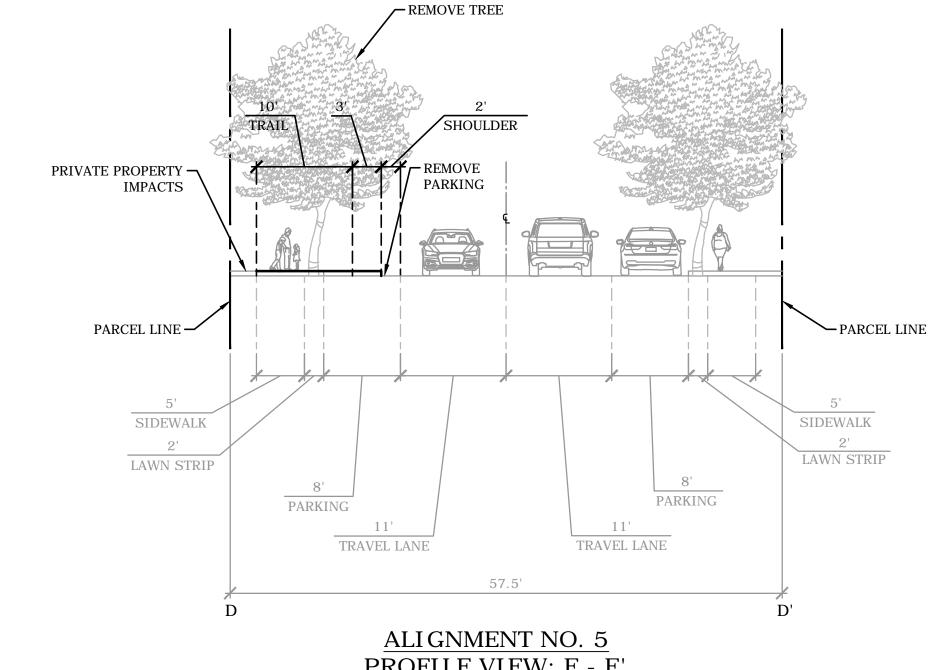
HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
DOCKSIDE PARK TO LITTLE STONY POINT

SHEET 5 OF 26

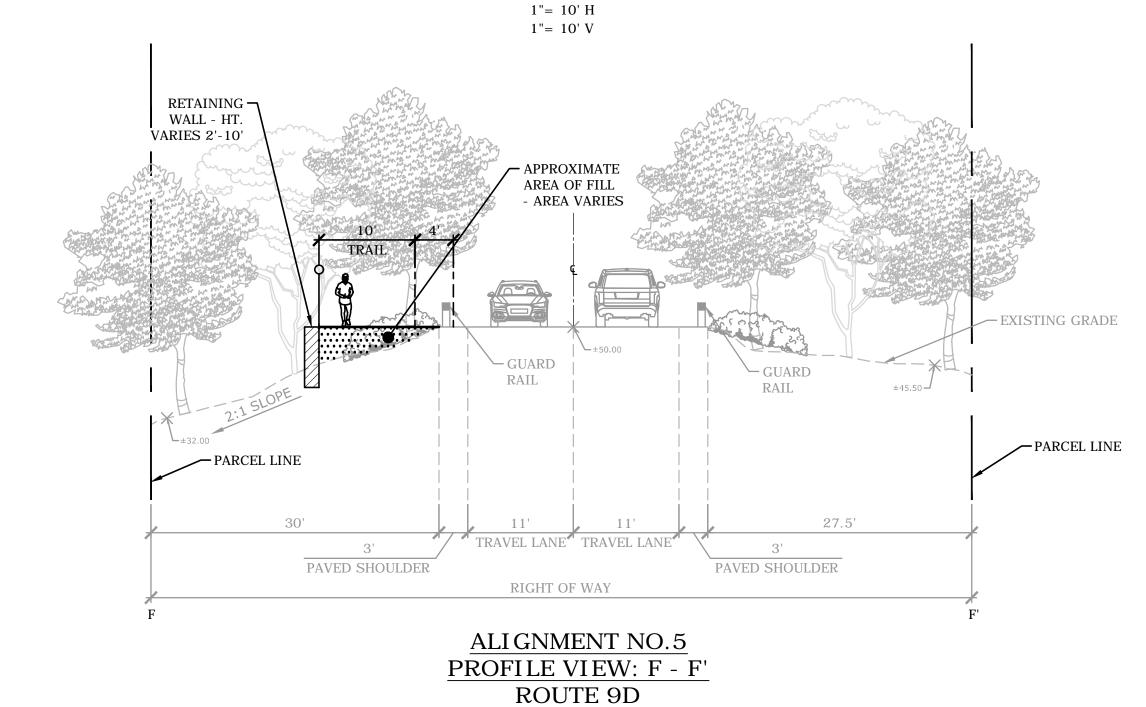








# PROFILE VIEW: E - E' ROUTE 9D - MORRIS AVENUE



1"= 10' H 1"= 10' V

SIDEWALK SEPARATED BIKE LANE SEPARATED BIKE LANE STRIPED BUFFER PARCEL LINE — PARCEL LINE ± 10'
SIDEWALK ± 10' SIDEWALK TRAVEL LANE TRAVEL LANE WIDTH VARIES WIDTH VARIES AMENITY STRIP AMENITY STRIP PARKING AISLE PARKING AISLE ALIGNMENT NO.5 PROFILE VIEW: A - A'

MAIN STREET

1"= 10' V

HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
DOCKSIDE PARK TO LITTLE STONY POINT

231 MAIN STREET, SUITE 102
NEW PALTZ, NY 12561
845.633.8153
WWW.MMINC.COM | SLRCONSULTING.COM



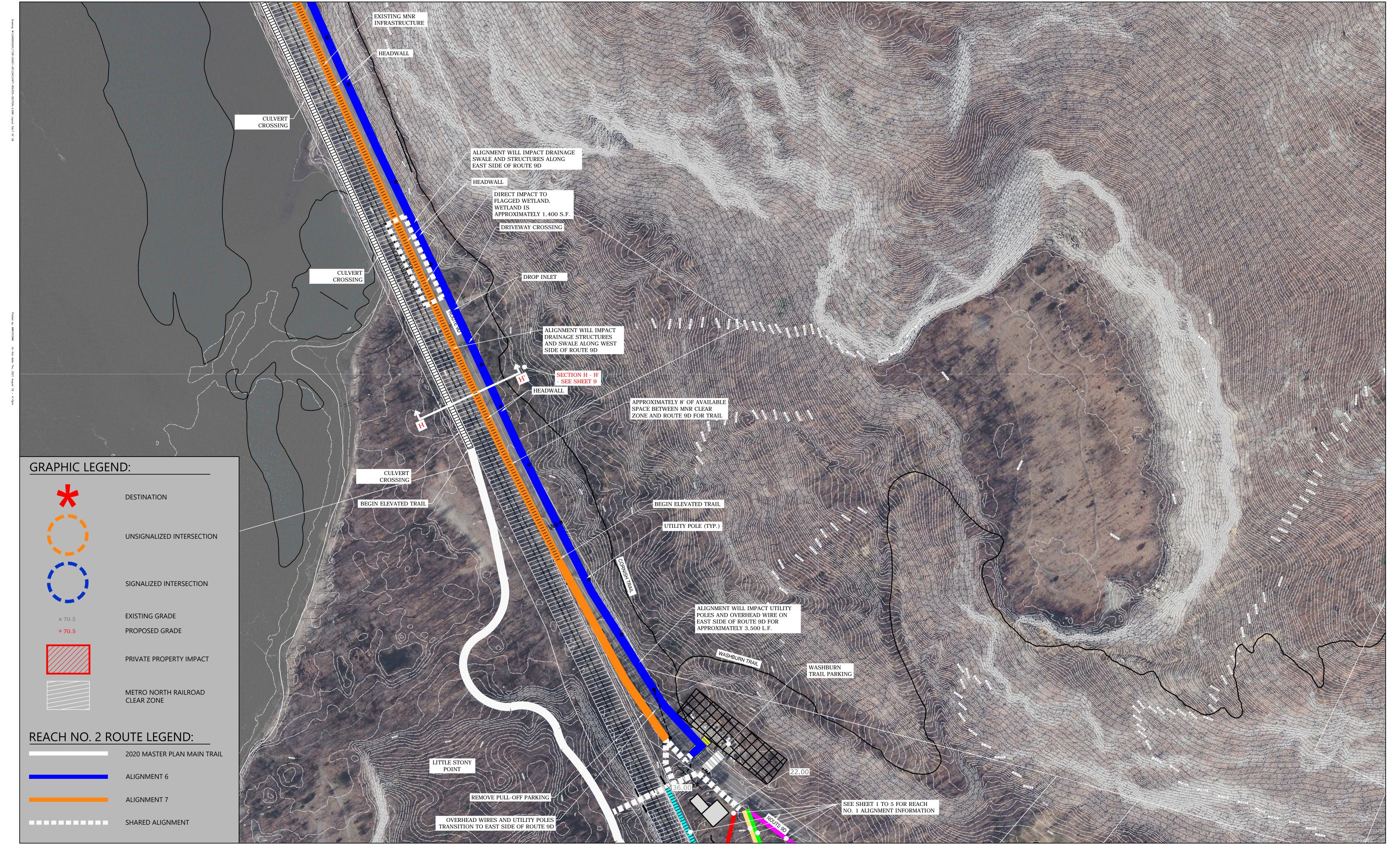
# **APPENDIX C**

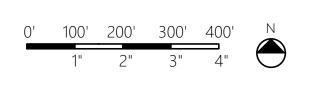
# **ALIGNMENT PLANS AND SECTIONS - REACH NO. 2**

# **Alternative Alignments Analysis**

Hudson Highlands Fjord Trail, Inc. One Civic Center Plaza, Suite 200 Poughkeepsie, NY 12601

February 2022





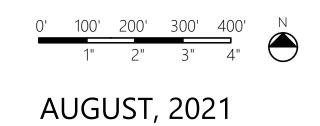
AUGUST, 2021

HUDSON HIGHLANDS FJORD TRAIL ALTERNATIVE ROUTING ANALYSIS LITTLE STONY POINT TO BREAKNECK

SHEET 7 OF 26

231 MAIN STREET, SUITE 102
NEW PALTZ, NY 12561
845.633.8153
WWW.MMINC.COM | SLRCONSULTING.COM
.andscape Architecture, and Land Surveying P.



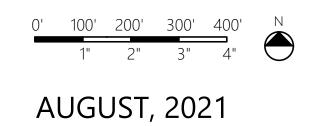


HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
LITTLE STONY POINT TO BREAKNECK

SHEET 8 OF 26

231 MAIN STREET, SUITE 102
NEW PALTZ, NY 12561
845.633.8153
WWW.MMINC.COM | SLRCONSULTING.COM
andscape Architecture, and Land Surveying P.

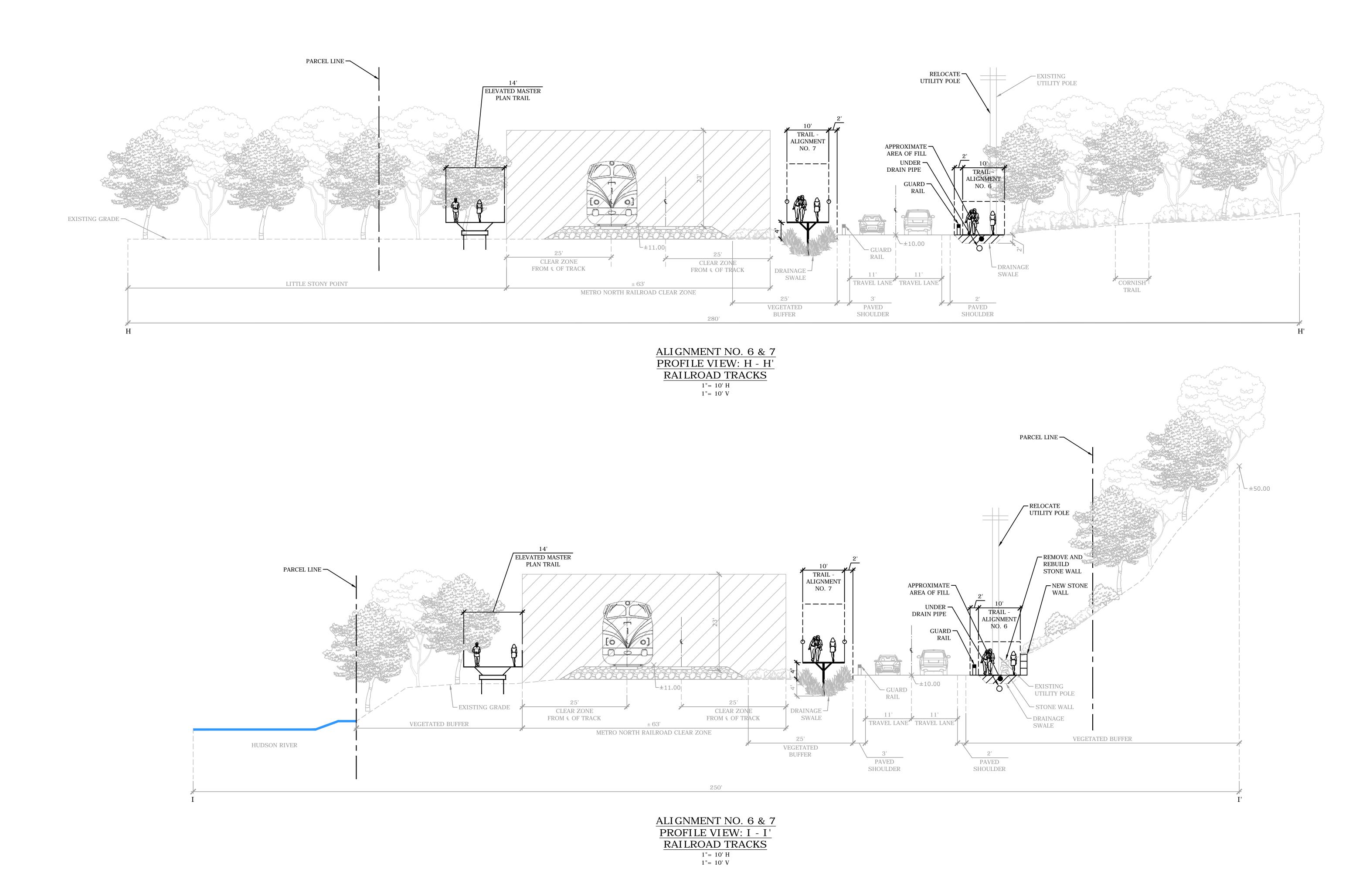




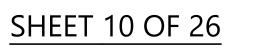
HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
LITTLE STONY POINT TO BREAKNECK

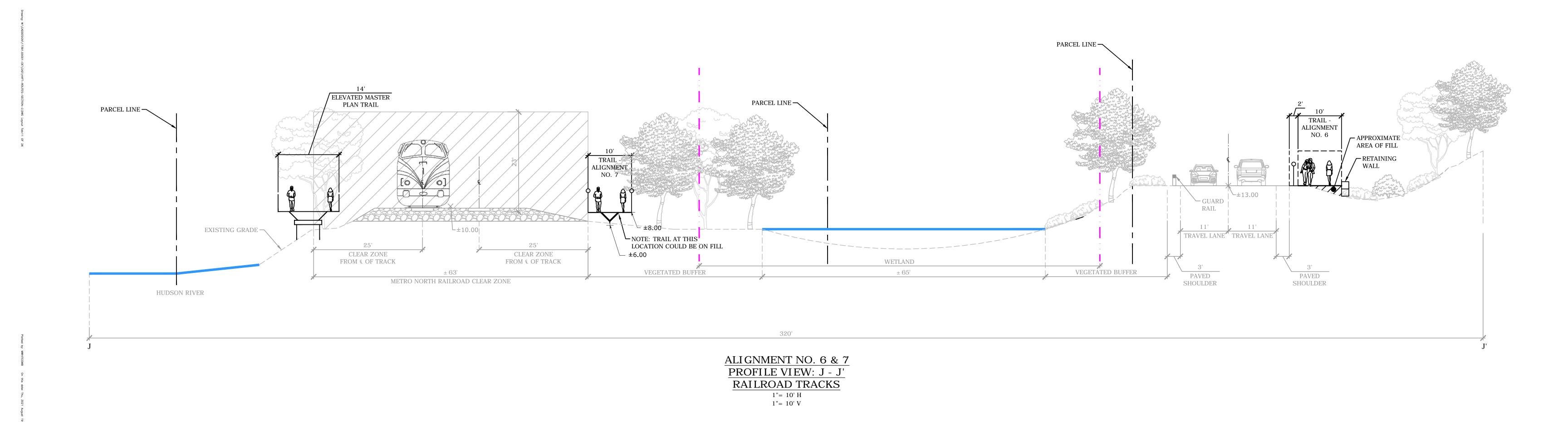
<u>SHEET 9 OF 26</u>

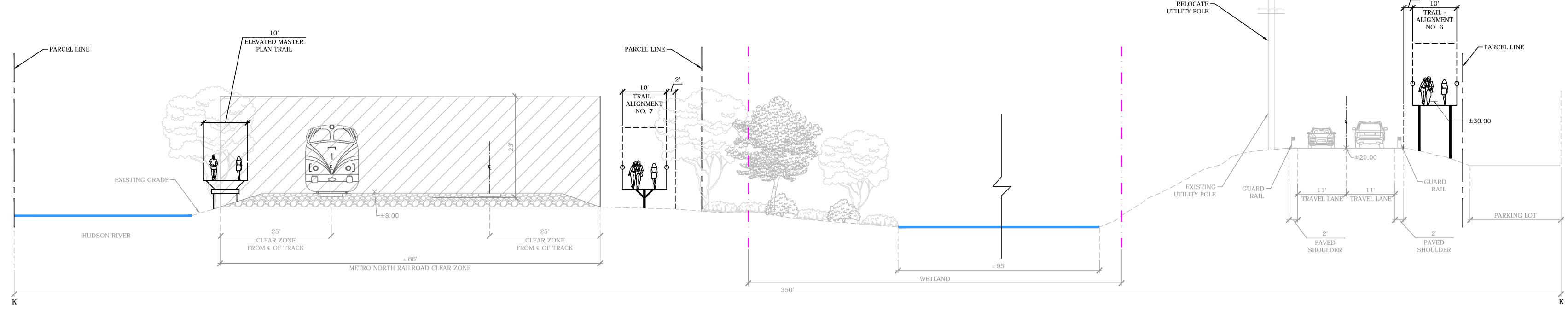




HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
LITTLE STONY POINT TO BREAKNECK







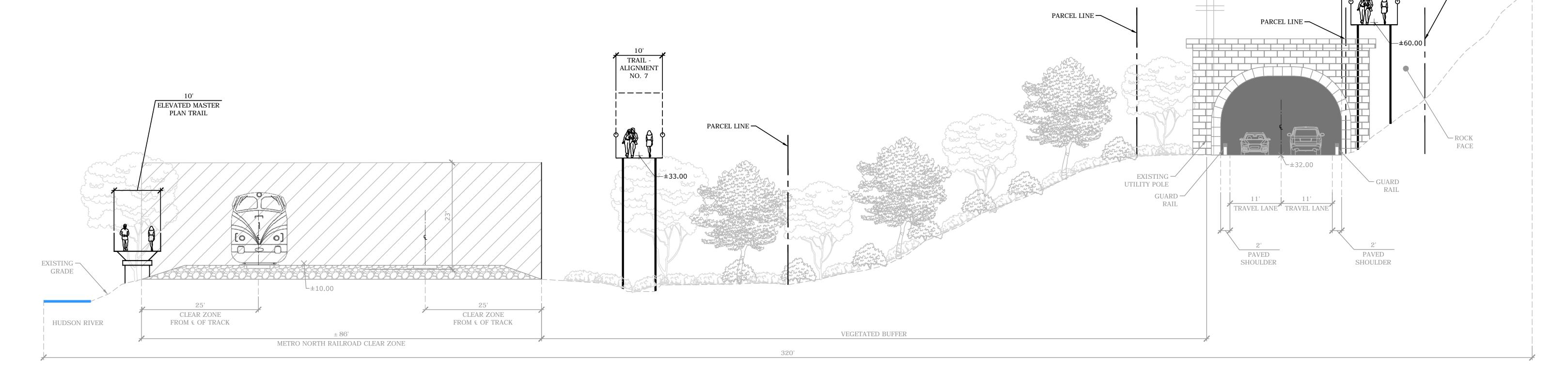
ALIGNMENT NO. 6 & 7 PROFILE VIEW: K - K' RAILROAD TRACKS 1"= 10' H 1"= 10' V

HUDSON HIGHLANDS FJORD TRAIL ALTERNATIVE ROUTING ANALYSIS LITTLE STONY POINT TO BREAKNECK



SHEET 11 OF 26

REACH NO.2 PROPOSED ALIGNMENTS - BIRDS-EYE VIEW TOWARDS BREAKNECK RIDGE



ALIGNMENT NO. 6 & 7
PROFILE VIEW: L - L'
RAILROAD TRACKS

1"= 10' H
1"= 10' V

HUDSON HIGHLANDS FJORD TRAIL
ALTERNATIVE ROUTING ANALYSIS
LITTLE STONY POINT TO BREAKNECK

SHEET 12 OF 26



PARCEL LINE



## **APPENDIX D**

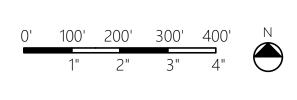
## **ALIGNMENT PLANS AND SECTIONS - REACH NOS. 3 AND 4**

## **Alternative Alignments Analysis**

Hudson Highlands Fjord Trail, Inc. One Civic Center Plaza, Suite 200 Poughkeepsie, NY 12601

February 2022

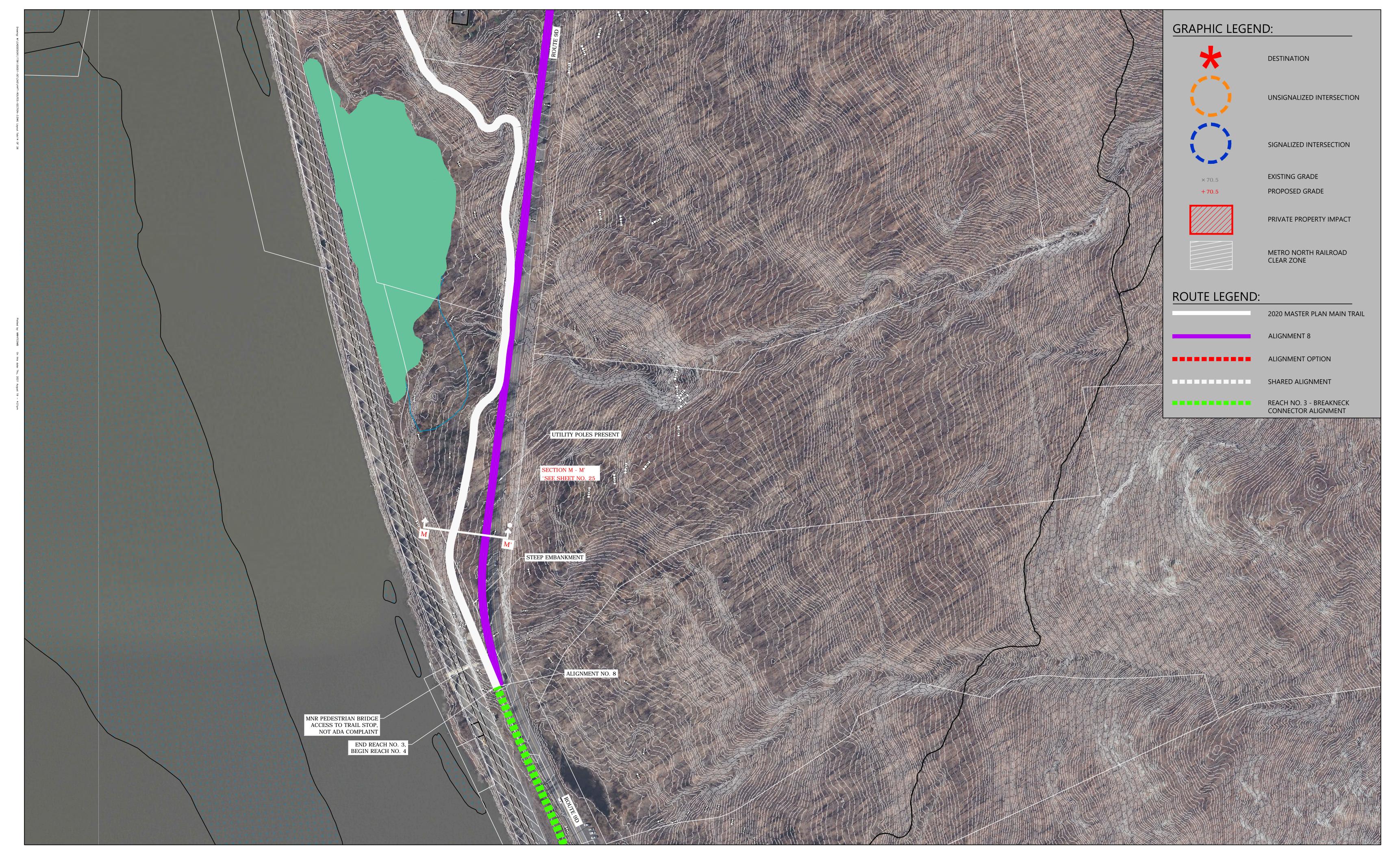


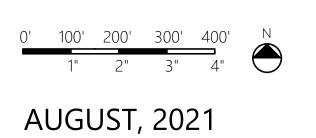


SHEET 13 OF 26

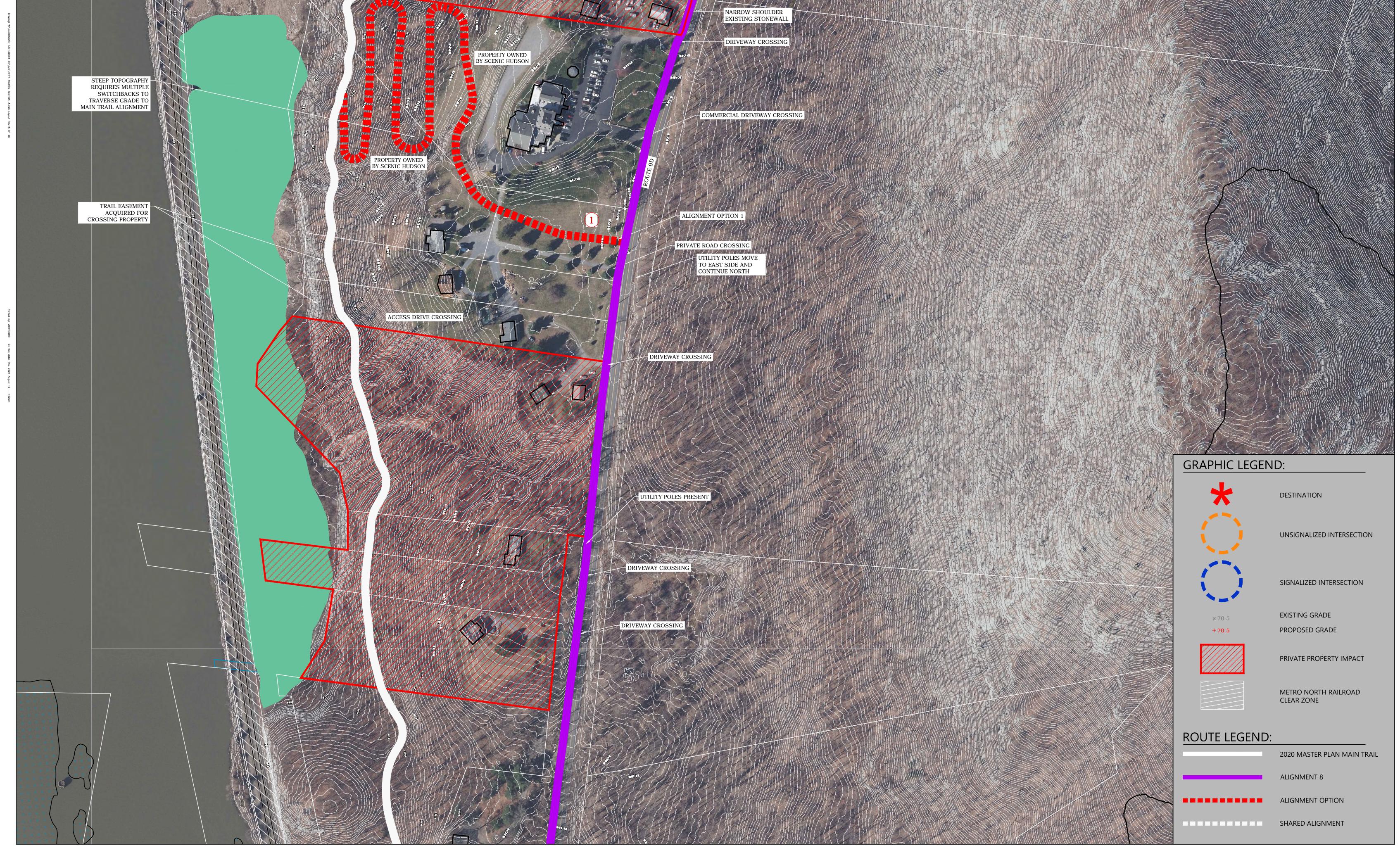
231 MAIN STREET, SUITE 102
NEW PALTZ, NY 12561
845.633.8153
WWW.MMINC.COM | SLRCONSULTING.COM

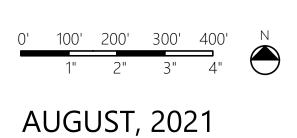
SLR Engineering, Landscape Architecture, and Land Surveying P.C.



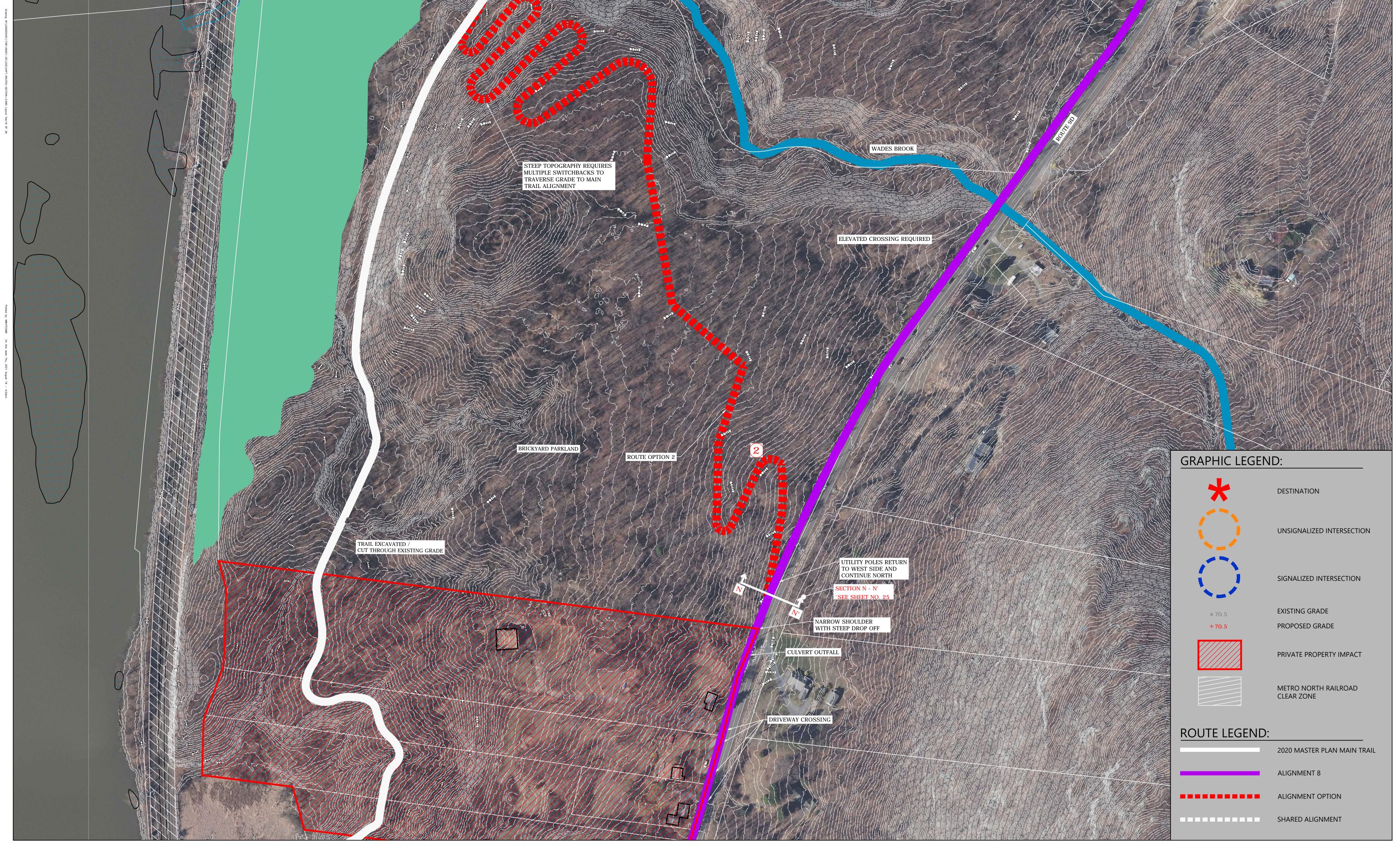


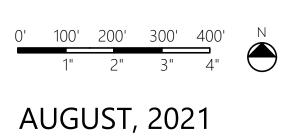
SHEET 14 OF 26



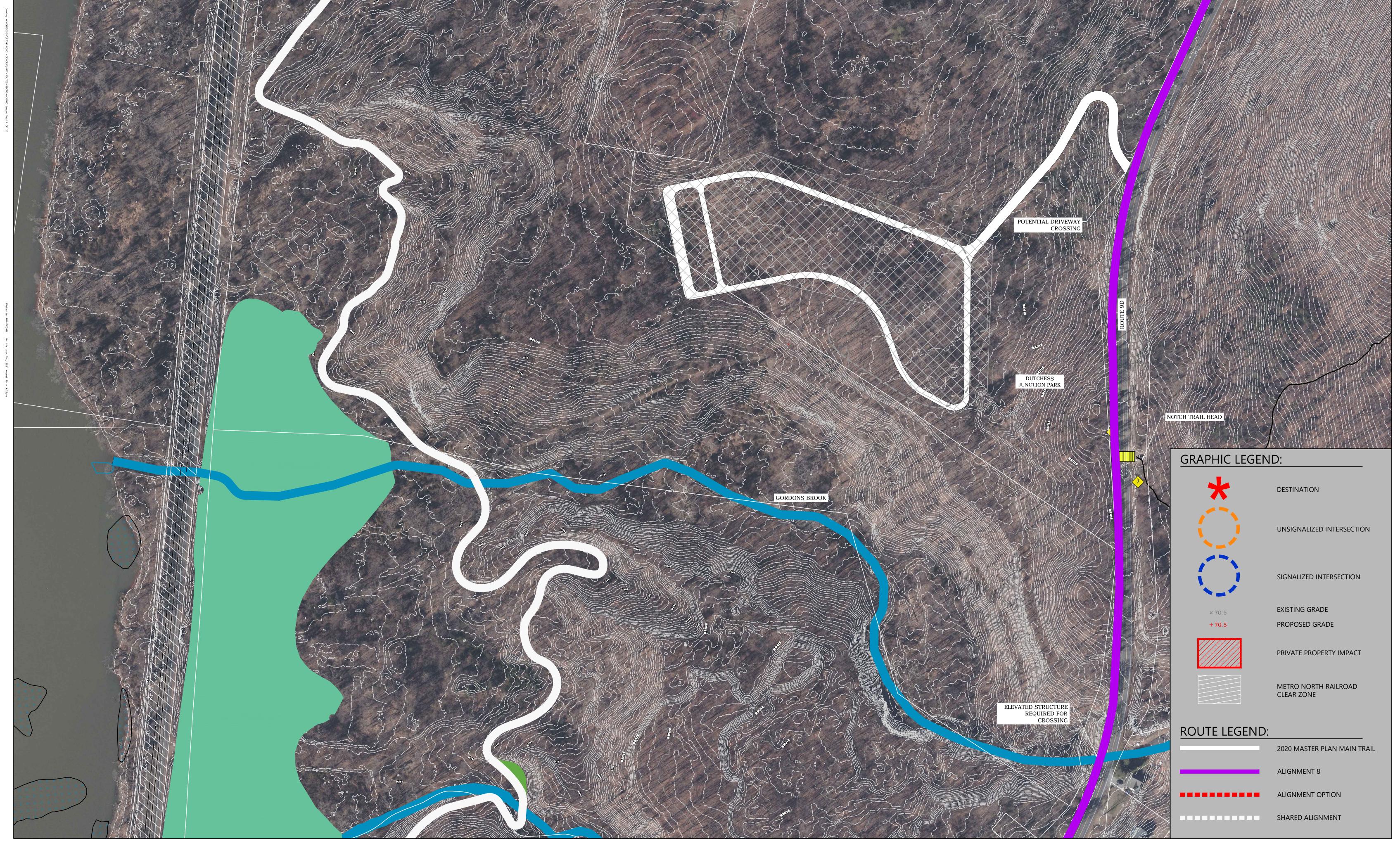


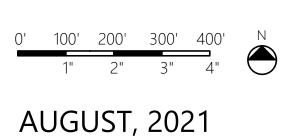
SHEET 15 OF 26



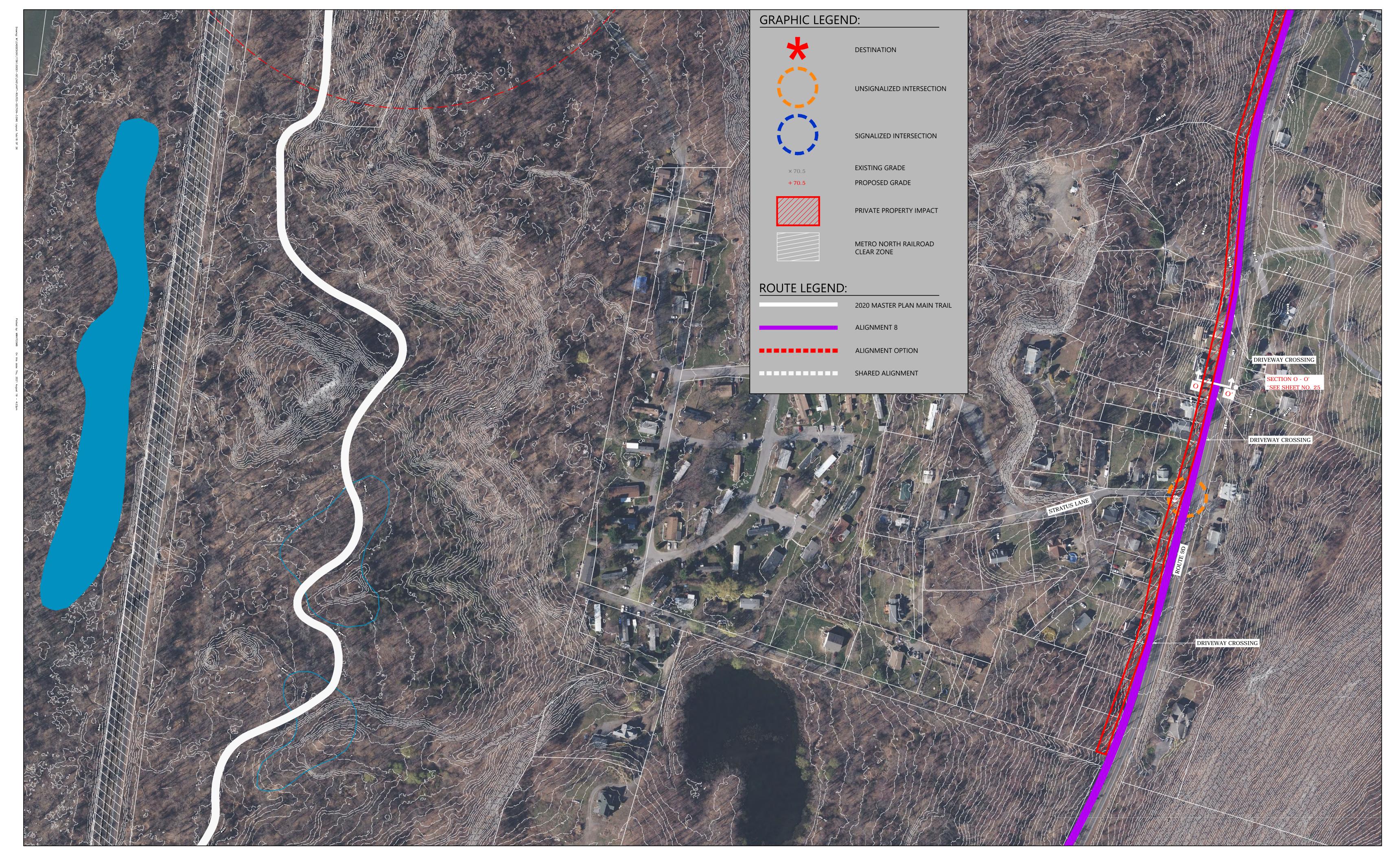


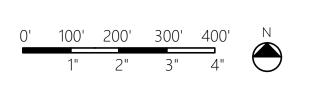
SHEET 16 OF 26

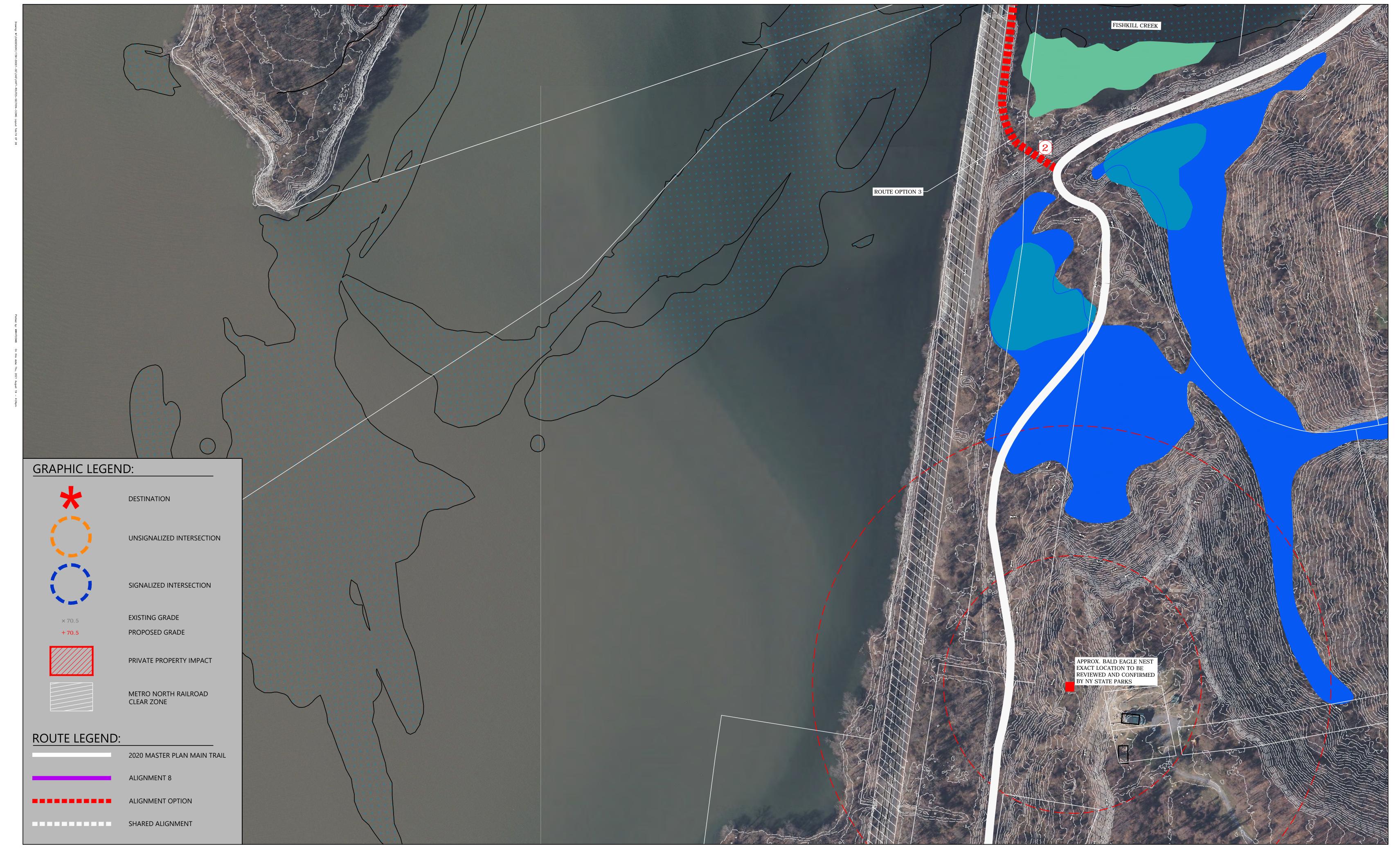


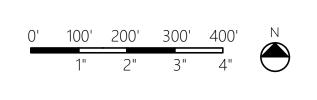


SHEET 17 OF 26



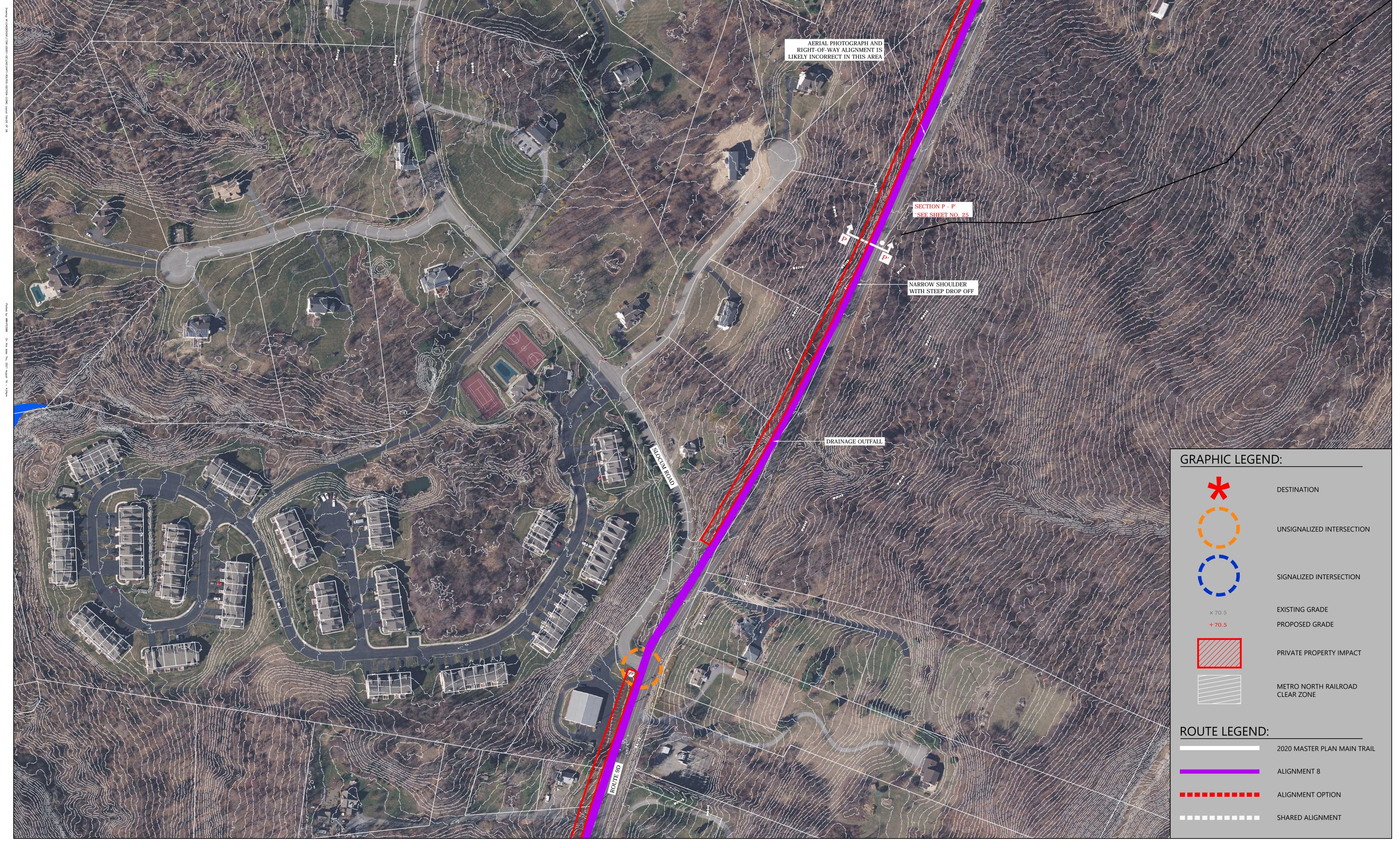


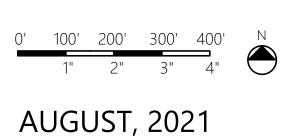




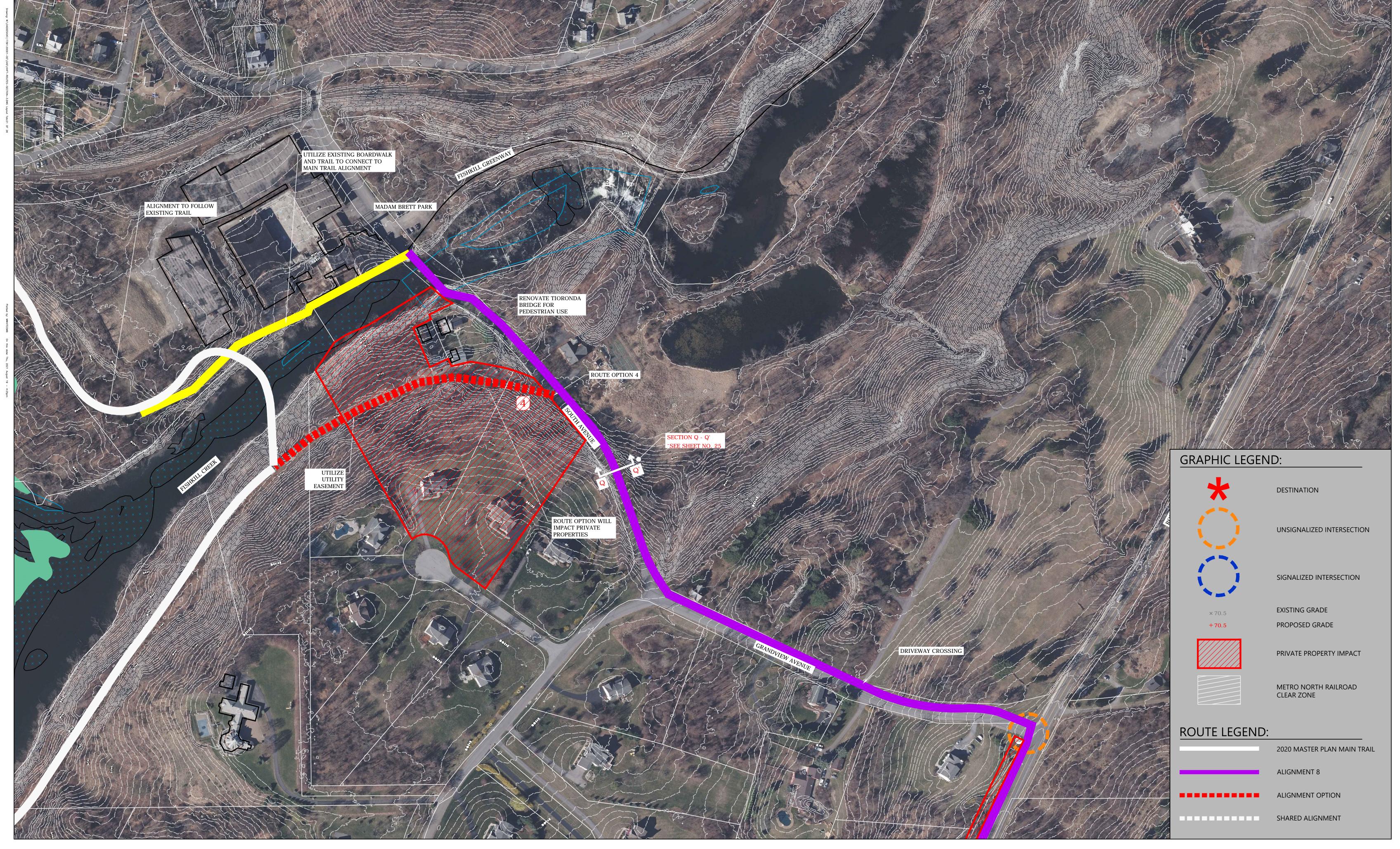
SHEET 19 OF 26

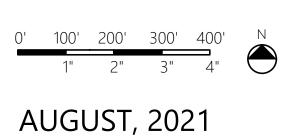
231 MAIN STREET, SUITE 102
NEW PALTZ, NY 12561
845.633.8153
WWW.MMINC.COM | SLRCONSULTING.COM
SLR Engineering, Landscape Architecture, and Land Surveying P.C.



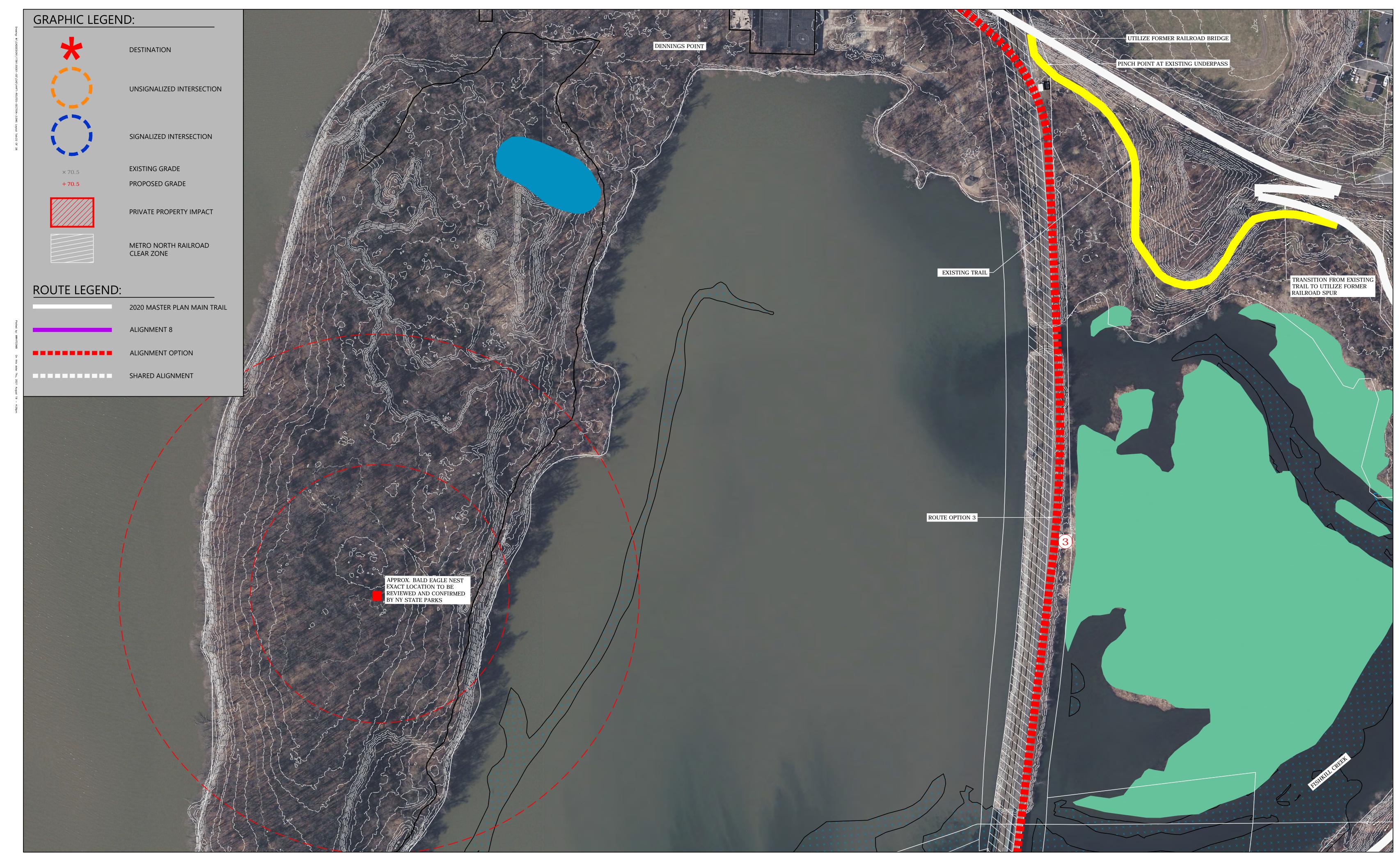


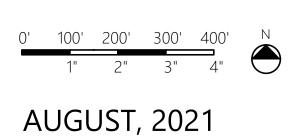
SHEET 20 OF 26





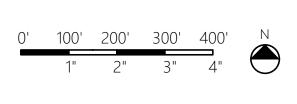
SHEET 21 OF 26

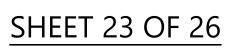




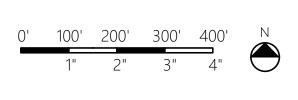
SHEET 22 OF 26







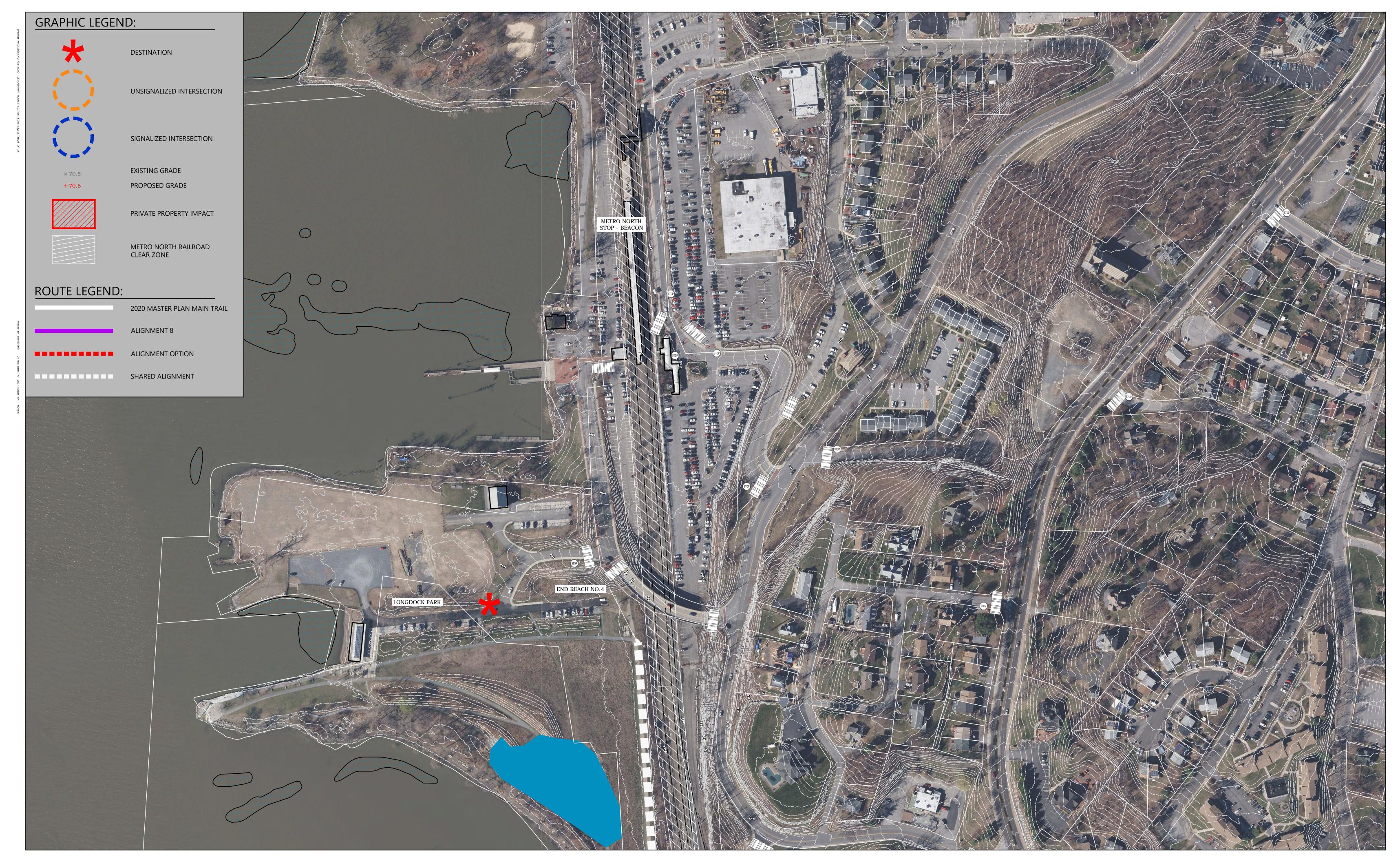


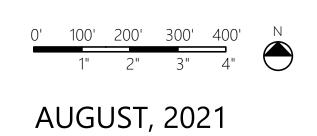


SHEET 24 OF 26

231 MAIN STREET, SUITE 102
NEW PALTZ, NY 12561
845.633.8153
WWW.MMINC.COM | SLRCONSULTING.COM

SLR Engineering, Landscape Architecture, and Land Surveying P.C.
Registration No. 083112
\*formerly known as Milone & MacBroom





SHEET 25 OF 26

