



# **Sterling Forest State Park Work Plans Hutchinson Trail Bridge and Reroute**

**February 13, 2017**

Prepared For  
Hudson Highlands State Park

Prepared By  
New York-New Jersey Trail Conference



## Annual Project Work Plan - Trails Form

Submit to Park Manager for review and approval prior to commencing work: for ALL trail work beyond standard maintenance practices (blazing, clearing brush from treadway/tree pruning, maintenance of erosion control structures) on existing designated trails.

State Park Name: Sterling Forest Year: 2017

Organization: The New York-New Jersey Trail Conference

Contact Name: Erik Mickelson

Contact Address: 600 Ramapo Valley Rd.

Contact Phone #: 760-893-9331

Contact Email Address: emickelson@nynjtc.org

Trail Name: Hutchinson at intermittent stream

Description of location of trail section to be worked on (if applicable): see map

GPS coordinates if available. Format: Decimal Degrees; Datum (circle one): NAD27, 83 or WGS84 (preferred)  
(Lat/Long): 41.19473, 74.23790 to 41.19519, 74.23823

Type of work (check all that apply):

- Re-alignment/relocation of trail section
- New trail development (includes designating new trails)
- Tread upgrades including installation of water management structures
- Bridge construction/replacement
- Trail Closure/Restoration
- Other: \_\_\_\_\_

Scope of work included in Trails Plan:  Yes  No (If no, requires additional review of proposal)

Description of work: (be specific including rock moving, tree cutting, trail work within 100 ft. of a water body/wetland, bridge work (*may require DEC permit*), construction of switchbacks or retaining walls, culvert and turnpike installation, etc.): New trail cutting, and clean up of old woods road segment, and bridge installation

Work Scheduled: 4/1/17 until completed

Attached map depicting area of work (required).  Digital photo (before)  Digital photo (after).

Submitted by (print): Erik Mickelson Signature: Erik Mickelson

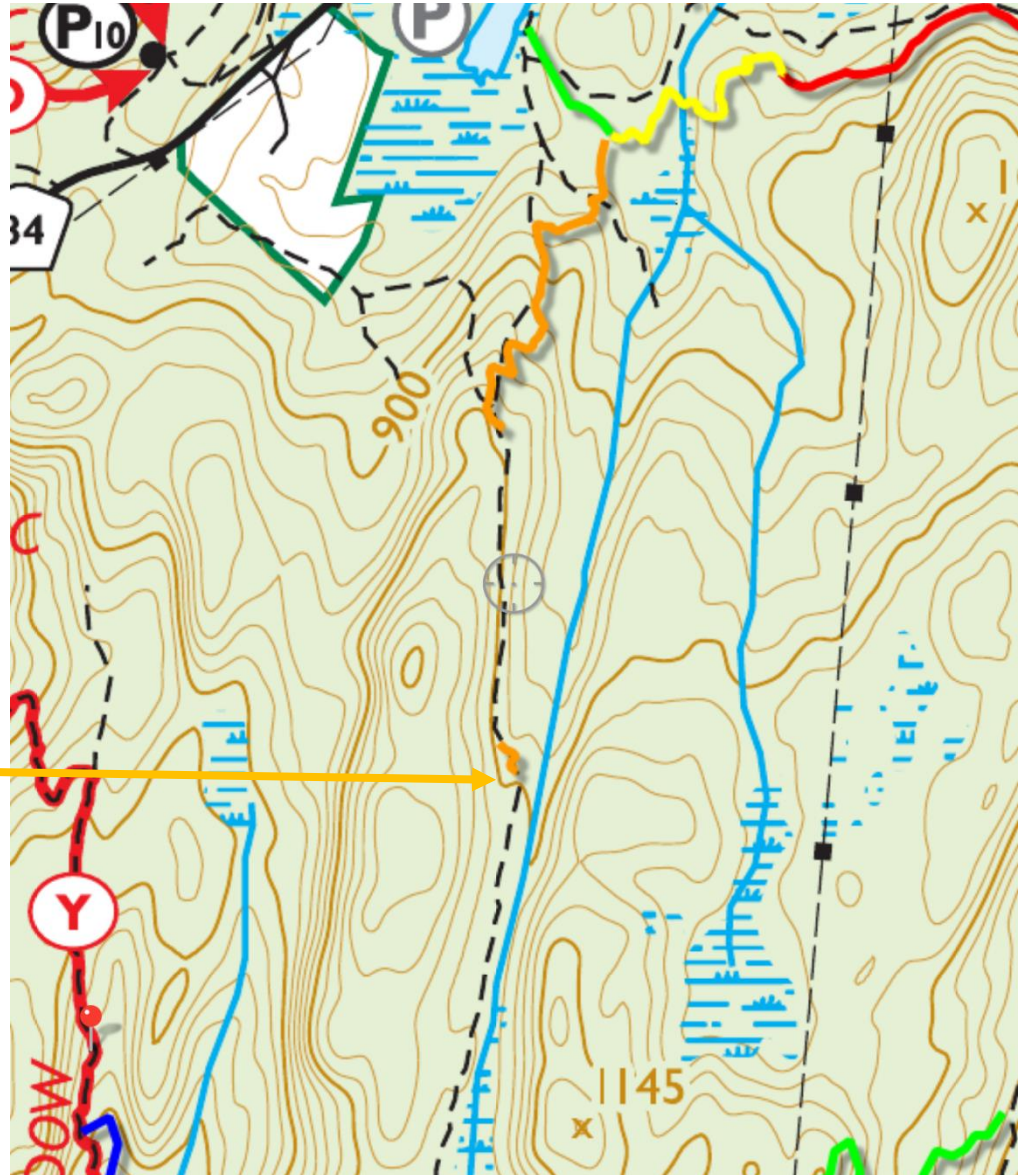
Date: 2/13/17

Approved by Park Manager (print): \_\_\_\_\_ Signature: \_\_\_\_\_

Date: \_\_\_\_\_

-Forward copy to Regional Natural Resource Steward and Capital Facilities Manager.

-Also forward copy to Trails Planning Unit if scope is not part of a Trails Plan.



Reroute and bridge



## Work Log Item Summary

The following table contains an approximate list of the major trail construction items which will be required for this section of trail. There are other minor items which are not listed here but described in the trail construction work log below.

Item	Unit	Totals
Plan segment length	In. ft.	
Sidehill	In. ft.	~60
Stone Steps	each	
Stone Cribbing	sq. ft.	
Stepping Stones	each	
Stone Paving	sq. ft.	
Turnpike/Causeway	In. ft.	
Drainage Structures	each	
Bridges	each	1
Crush Fill	cu. ft.	
Surfacing	cu. ft.	

\* Work Log Item Summary is for construction estimate purposes only. Actual project accomplishments may vary.

## General Trail Construction Notes

1.NYNJTC Trail Development Level: 3

- Development level details below, and this link: <https://www.nynjtc.org/sites/default/files/TrailDesignStandards.pdf>
- Trail Use Type: **Hike, Bike, Equestrian (no horses on bridge)**
- Trail Tread Width Range: **24" - 48"**, tread should be natural surfacing where possible. **Where necessary, tread definition, filling, and removal of loose rock will be performed to keep hikers on trail and remove safety hazards.**
- Running Grade Range: **0-12%**, Grades above 20% will have steps installed.
- Corridor: **4'x8'**, all cuts should be flush to tree or ground. **Stumps within treadway should be removed.**
- **Deviations from Trail Development Level Standards:**

- 2.The trail layout/existing trail improvement follows the general principles of sustainable trail design with the added objective of creating an interesting, scenic, and low maintenance route.
- 3.All local stone harvesting/splitting/shaping must be done away from the trail as to not significantly alter the appearance of the surrounding area from the trail.
- 4.Safeguards should be made to protect trailside vegetation including the use of "tree bumpers."
- 5.All trailside impacted areas must be renovated with leaves, logs, and other on-site organic debris.
- 6.Visible drill holes on stone should be minimized to the extent possible with cut/split faces mixed in with natural faces.
- 7.Organic materials/duff must be removed from the ground surface before trail construction commences. These materials must be stockpiled for finishing work and trail closure purposes.
- 8.Backfill materials may be stone up to 3". To ensure proper drainage, mineral soil should not be used.
9. **Site Specific Notes: This trail crosses a stream. All efforts should be made to not disturb the stream.**

## Safety Notes

- 1.Each day will begin with a safety tailgate meeting outlining environmental, flora, fauna, work, communication, site, and tool related hazards and mitigation practices.
- 2.Proper personal protective equipment must be worn by all trail workers while on the worksite including long pants, closed-toe shoes, work gloves, eye protection, and hard hats. Ear protection must be worn around power equipment. Dust masks/respirators must be worn when drilling rock.



These photo references indicate the location of major work items as well as the trail centerline indicated by a solid yellow line shown in each photo.

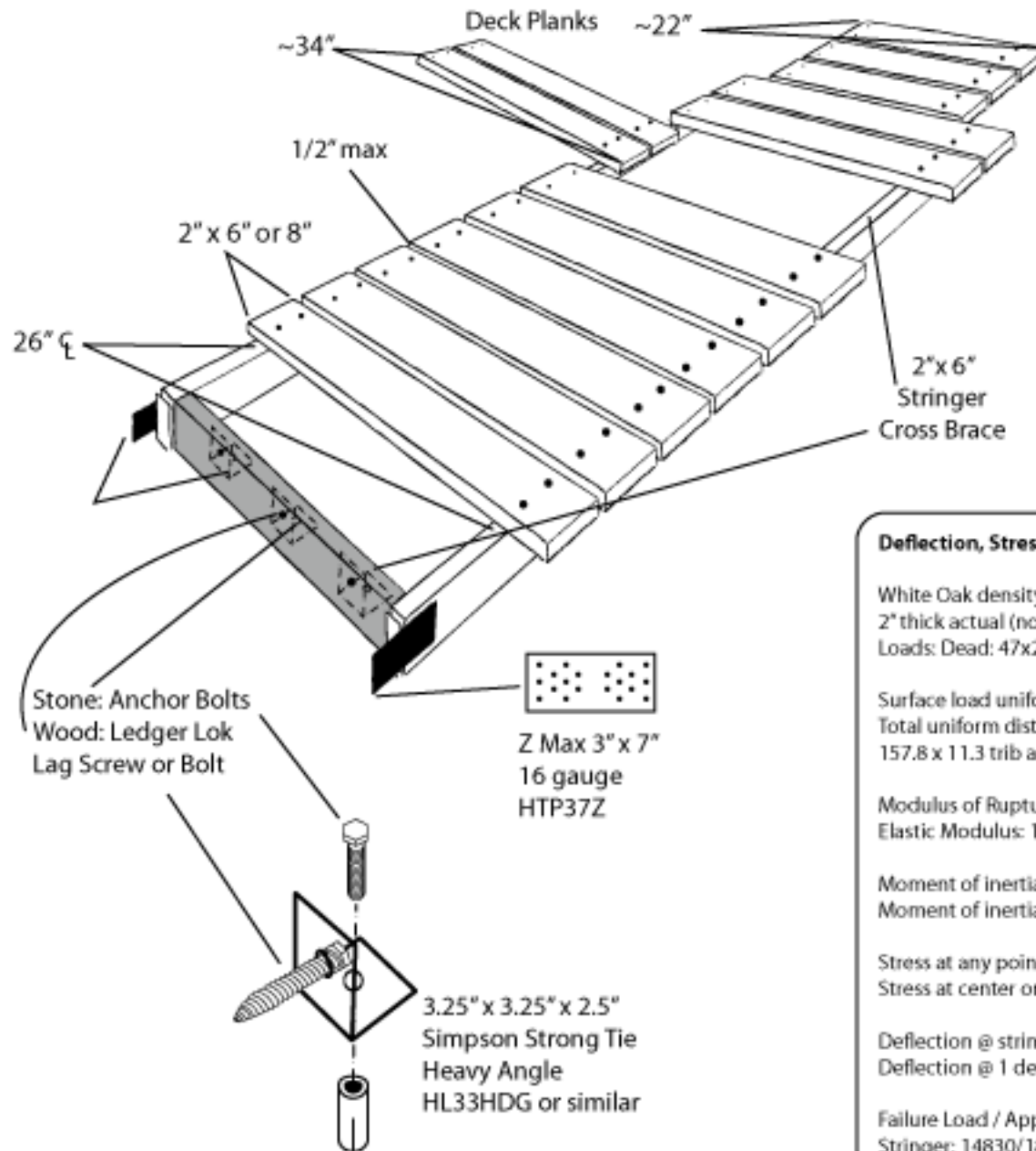
To effectively use this trail construction work log, place yourself approximately where the photographer stood, note the trees, boulders, or other features in the photo and that will help you reference where the trail is to be built/improved. Remember you are looking at photos which are in two dimensions and the field situation is in three dimensions. In addition, expect the view to change over time given more vegetation, downed trees, etc.

Arrows point to the approximate location of the work needed, or the location of a singular structure, such as a drainage structure. Two arrows or lines show the approximate start and finish of on-going structures or types of work, such as stone cribbing, stairs, and sidehill.

Each section to be built will be field staked or pin-flagged where needed by the trail designer prior to construction.

Note: Trail routing assumes a 50 foot corridor on either side of the centerline in which to move or realign the trail. For example, a trail might need to be realigned around a seep, large boulder, or bedrock. If the trail needs to be moved outside of the 50ft corridor due to unforeseen construction constraints, it will be brought to the land manager's attention for approval. A new work log photo with proper proof of approvals will be inserted into this document (at the end as an addendum to the slide/s in question).

## Bridge Plans- Puncheon (Type 3)



### Hardware

Star Drive Flat-Head Wood Deck Screw #10 3.5 in.  
 Ledger Lok Steel Hex-Head Ledger Board Fastener 3/8  
 Simpson Strong Tie:  
 Drop-In Anchor 1/2 in. x 2 in.  
 "Titen" Heavy Duty Screw Anchor 1/2 in. x 5 in.  
 Tie Plate Z Max 3" x 7" 16 gauge HTP37Z  
 Heavy Angle 3.25" x 3.25" x 2.5" HL33HDG or similar  
 Optional Medium L Angle 2" x 4" ML24Z  
 Rebar 1/2" x 10', cut into 2 ft sections or per soil

### Deflection, Stress, and Load Estimates

White Oak density at 12% moisture: 47 lbs/ft<sup>3</sup> (Black Locust: 48)  
 2" thick actual (not nominal)  
 Loads: Dead: 47x2/12 = 7.8 psf | Live: 90 psf | Snow: 60 psf

Surface load uniformly distributed = (7.8+90+60) = 157.8 psf ASCE 7 Load Combination  
 Total uniform distributed line load of half of one 34"x 8" deck section on one stringer =  
 157.8 x 11.3 trib area + 18.9 dead stringer line load x 96 in = 1820 lbs Oak, 1822 Locust

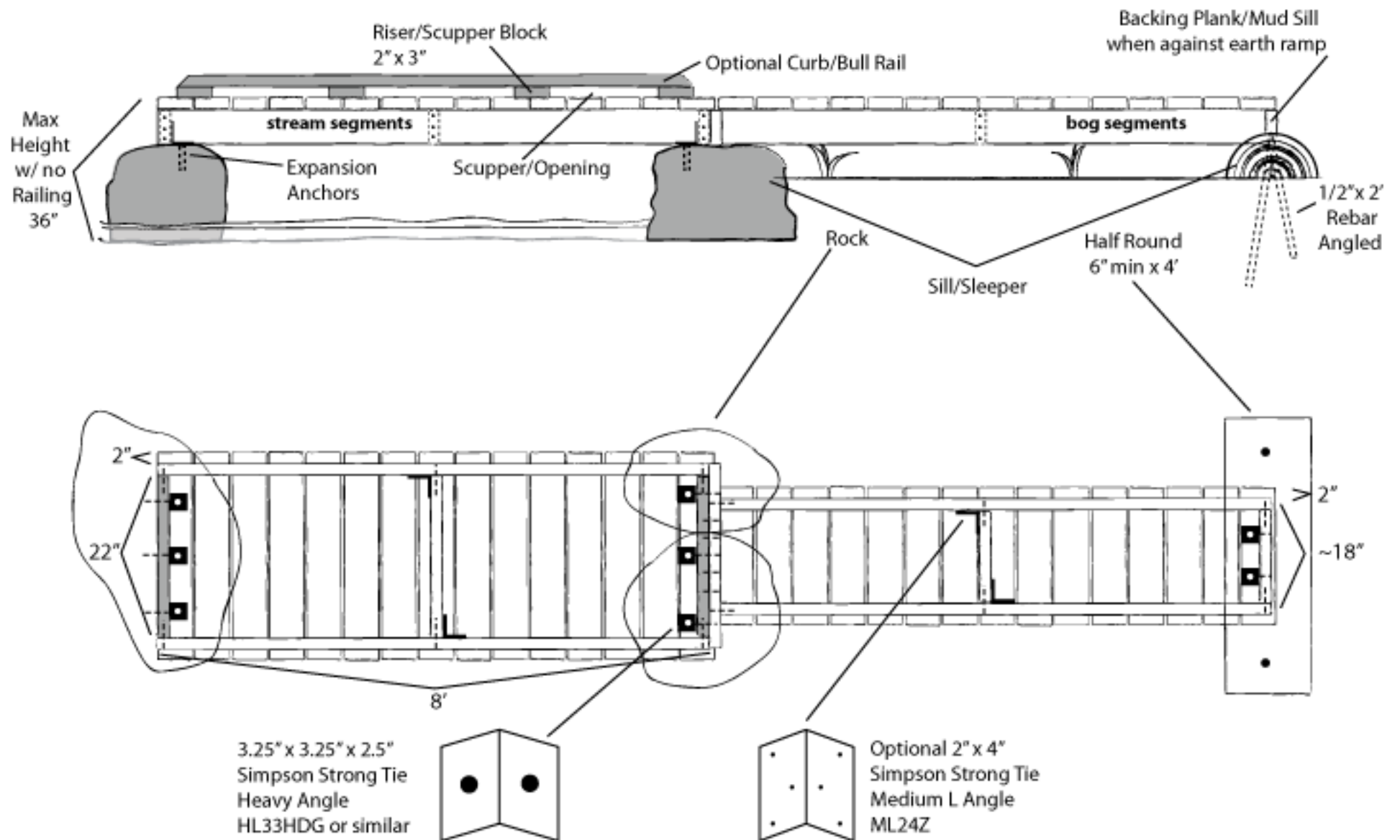
Modulus of Rupture: 14,830 psi Oak, 19,400 Locust  
 Elastic Modulus: 1,762,000 psi Oak, 2,050,000 Locust

Moment of inertia for 2"x 6" vertical stringer = 36 in<sup>4</sup>  
 Moment of inertia for 2" x 6" horizontal deck plank = 4 in<sup>4</sup>

Stress at any point or center on 1 stringer = -1820 psi Oak, -1822 Locust  
 Stress at center on 1 deck plank = -152 psi Oak, 153 Locust

Deflection @ stringer @ center w/ Total load = 0.33 mm Oak, 0.28 Locust  
 Deflection @ 1 deck plank @ center w/ Total load = 0.0049 mm Oak, 0.0042 Locust

Failure Load / Applied Load = Factor of Safety = MOR / Stress =  
 Stringer: 14830/1820 = 8.15 Oak, 10.6 Locust; Deck plank: 97 Oak, 127 Locust





## Bridge Supplies

Total 2" x 6" x 8' planks needed 40

3 4' Half Round Sills, 5 Rock Sills

4 screws per deck plank	414
6 screws per stringer	84
6 screws per stringer plate	42
6 screws per lateral brace	42
6 screws per lateral brace angle	84
Screw TOTAL in lbs (~43 count/lb)	15.5
Angles 2 ft sections (on wood sill)	6
Angles 3 ft sections (rock sill)	15
Anchor sleeves (3 per rock sill)	15
Anchor bolts (3 per rock sill)	15
Lag screws	27
Rebar (2 per wood sills)	6
Rebar ft need	12

\*See drawings for details



**22 hemlocks and beeches**



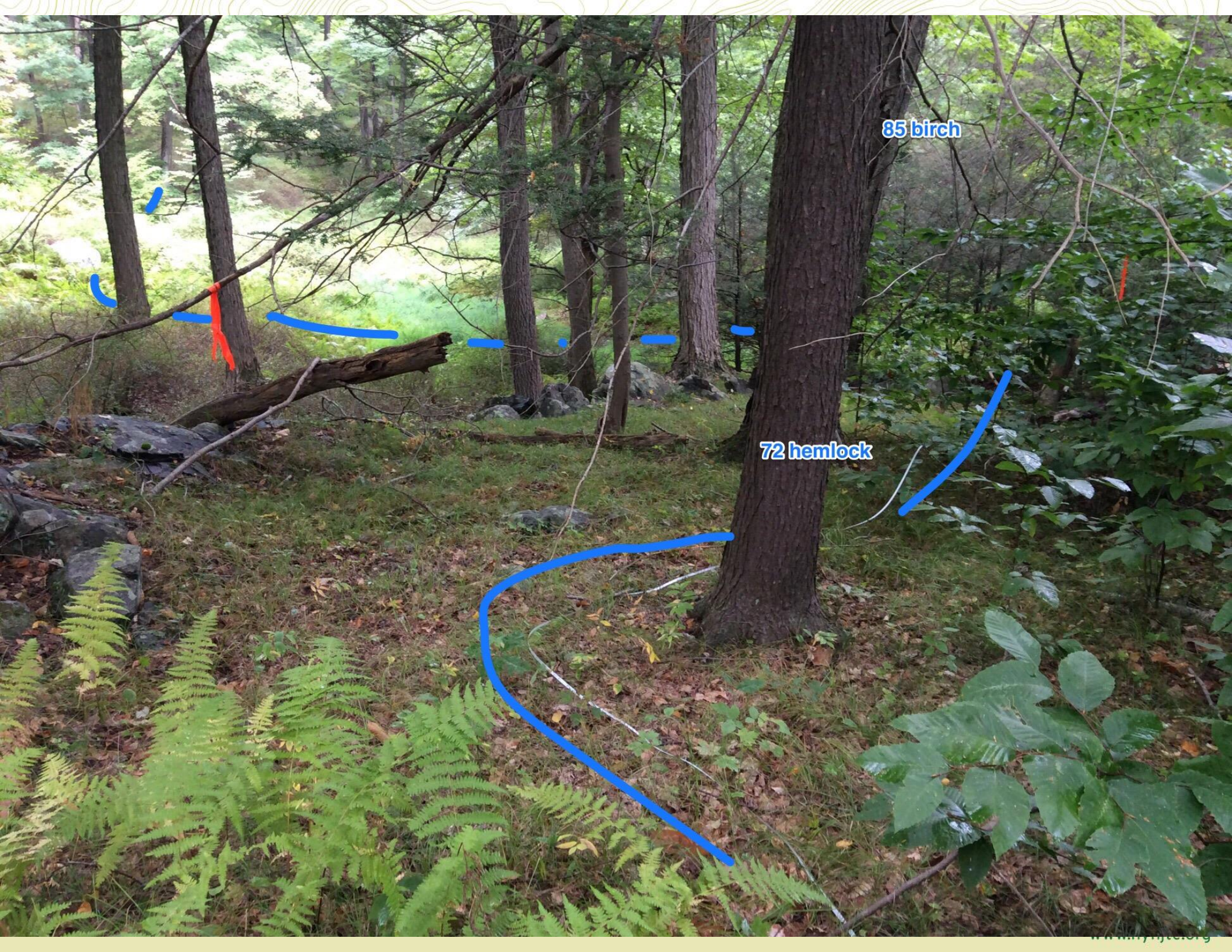
**Woods rd  
Block**





50

72



85 birch

72 hemlock



85

115 woods rd

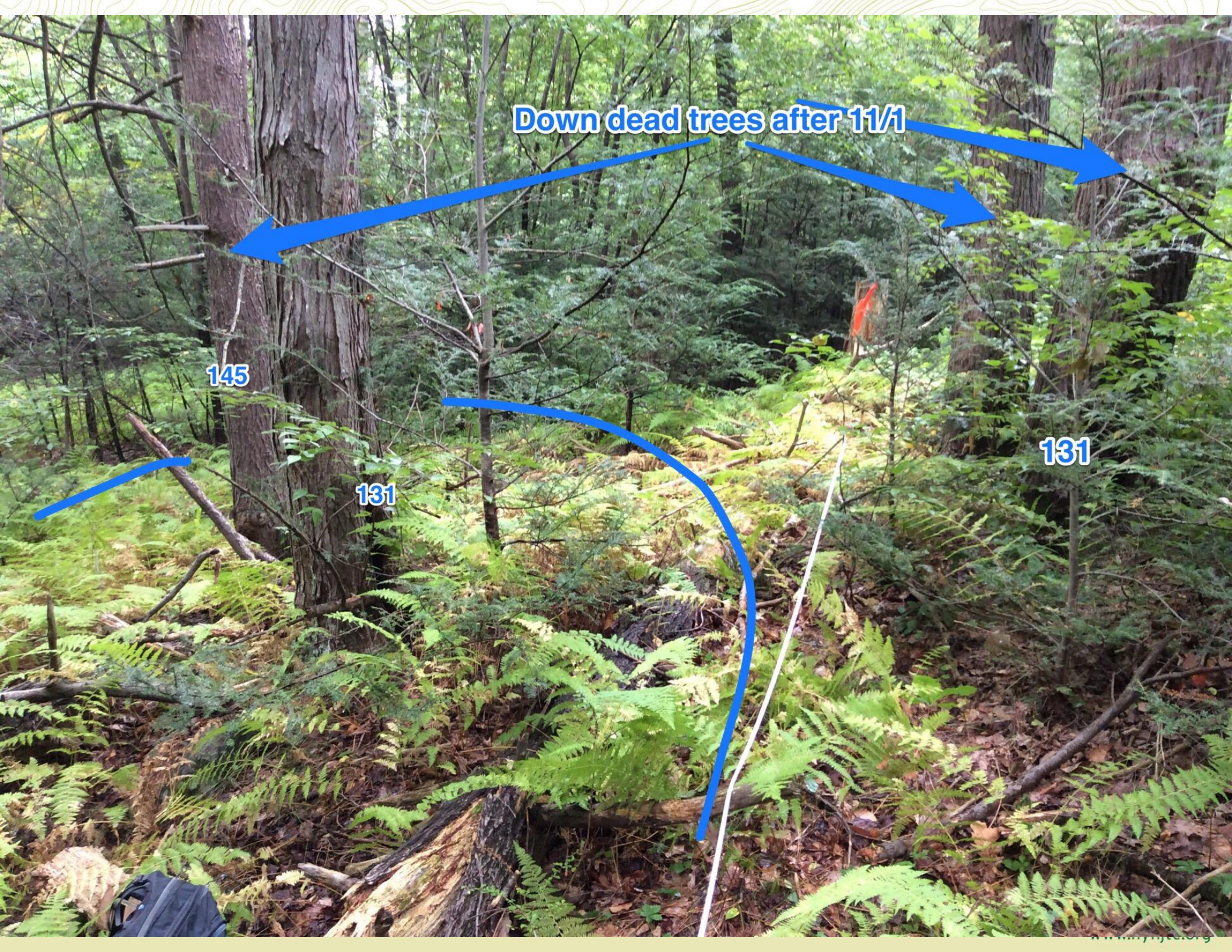
108 downed tree

Down dead trees after 11/1

145

131

131



**180 woods rd**

**158**

**Force horses to upper left of bridge**

**New alignment**

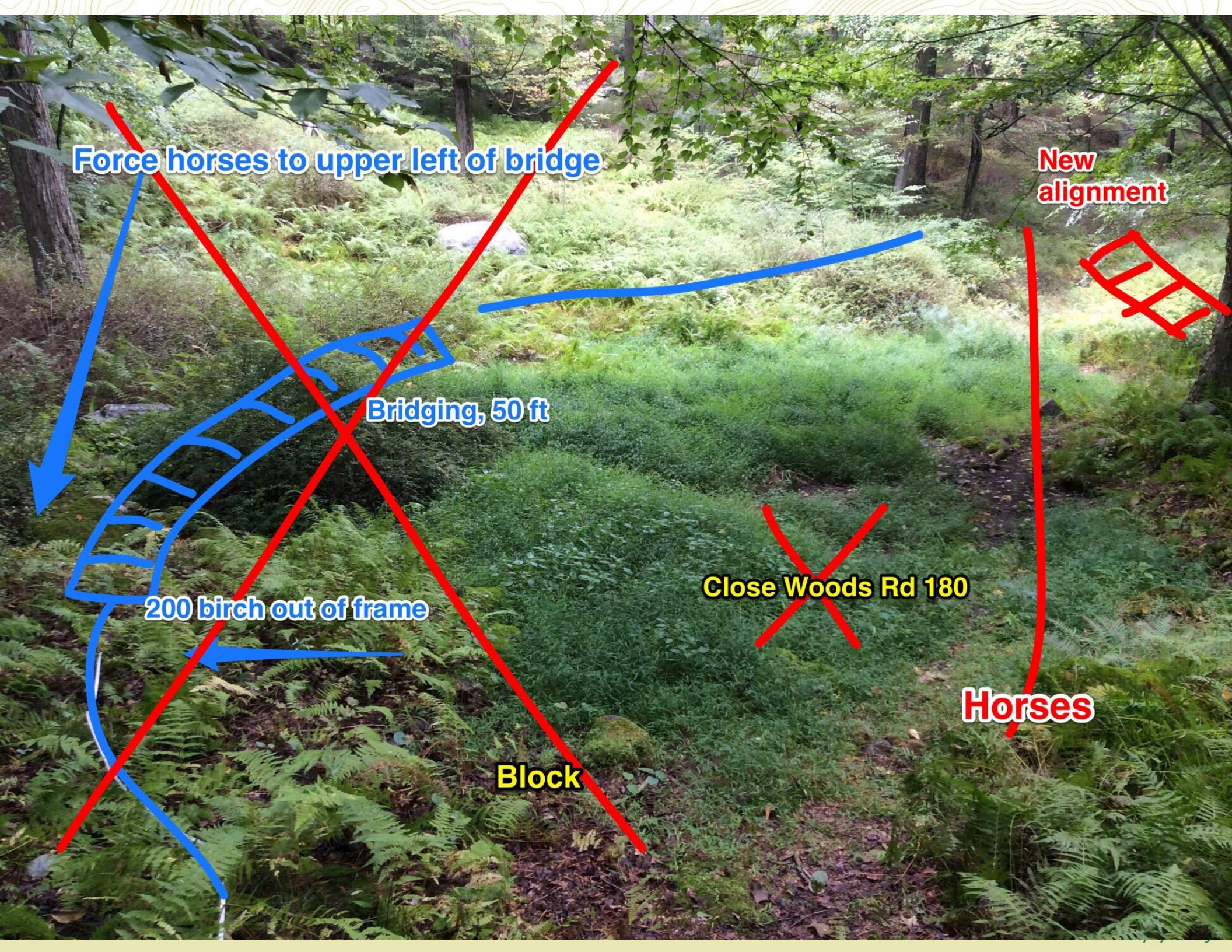
**Bridging, 50 ft**

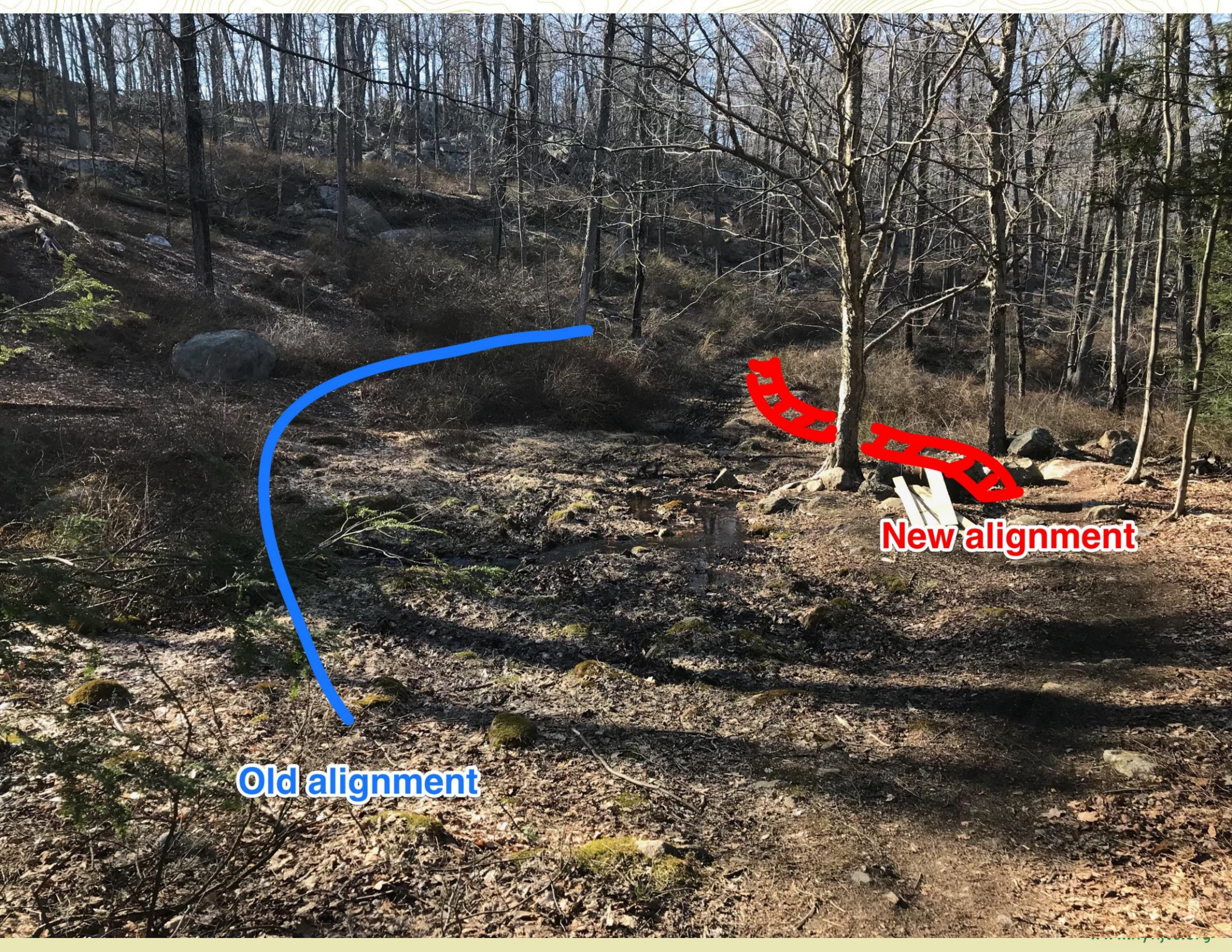
**200 birch out of frame**

**Close Woods Rd 180**

**Horses**

**Block**





**Old alignment**

**New alignment**



Birch 360

New alignment

Woods rd

400

