Collaboration Restores Aquatic Connectivity in the Norwalk River

Stantec

Connecticut Association of Wetland Sciences

2024 Annual Meeting

Strong Pond Dam Removed!

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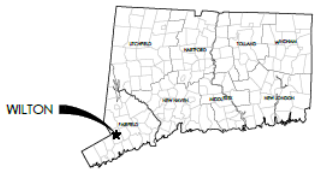
Save the Sound
Action for our region's environment.

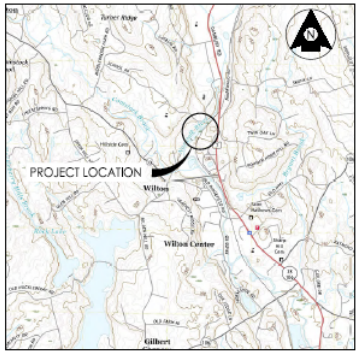
Save the Sound

Strong Pond Dam Removal Project

Norwalk River, Wilton, Connecticut; CT Dam ID#16105



LOCATION MAP



VICINITY MAP
NOT TO SCALE

DIG SAFE NOTE:
UTILITIES ARE PLOTTED FROM FIELD LOCATION AND SHOULD BE CONSIDERED APPROXIMATE. OTHER UTILITIES MAY EXIST. CONTRACTORS MUST CONTACT ALL UTILITY COMPANIES BEFORE EXCAVATING AND DRILLING. ALSO, CALL THE CONNECTICUT "CALL BEFORE YOU DIG" CENTER AT 1 (800) 922-4455 OR 811
WEBSITE: WWW.CBYD.COM

INDEX OF SHEETS

DRAWING NO.	TITLE
	COVER SHEET
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C-100	EXISTING CONDITIONS PLAN
C-101 & C-102	CONSTRUCTION ACCESS, SITE PREPARATION AND STAGING/LAYDOWN PLAN
C-103	PROPOSED CONDITIONS AND SITE RESTORATION PLAN
C-104 TO C-108	WATER AND SEDIMENT MANAGEMENT PLAN
C-109	PROPOSED GRADING PLAN AND CHANNEL PROFILE
C-110 & C-111	PROPOSED GRADING PLAN
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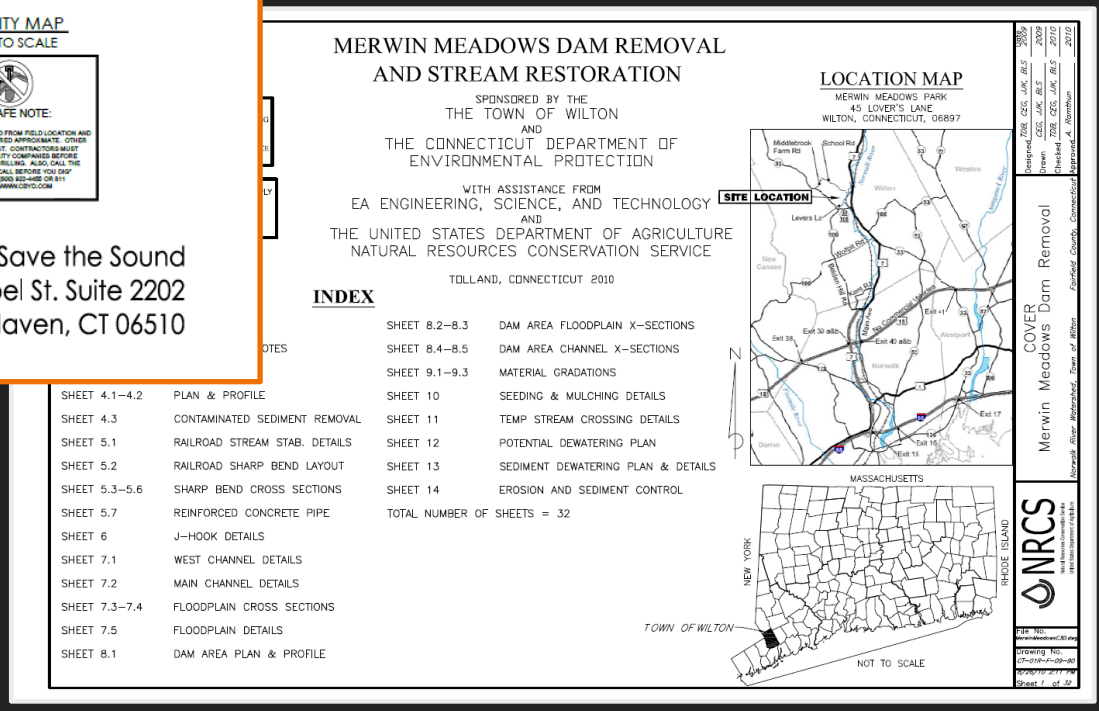
C-113	DAM REMOVAL CROSS SECTIONS
C-114 TO C-116	SECTIONS AND DETAILS
C-117	EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

2023.03.09
PROJECT NUMBER: 195601697

ISSUED FOR CONSTRUCTION
MARCH 2023

Save the Sound
900 Chapel St. Suite 2202
New Haven, CT 06510

Take Me to the River



MERWIN MEADOWS DAM REMOVAL AND STREAM RESTORATION

SPONSORED BY THE
THE TOWN OF WILTON
AND
THE CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION

WITH ASSISTANCE FROM
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
AND
THE UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

TOLLAND, CONNECTICUT 2010

LOCATION MAP
MERWIN MEADOWS PARK
45 LOVER'S LANE
WILTON, CONNECTICUT, 06897

SITE LOCATION

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SHEET 5.7	REINFORCED CONCRETE PIPE	SHEET 12	POTENTIAL DEWATERING PLAN
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SHEET 7.1	WEST CHANNEL DETAILS	SHEET 14	EROSION AND SEDIMENT CONTROL
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MASSACHUSETTS
NEW YORK
RHODE ISLAND
TOWN OF WILTON
NOT TO SCALE

NRCS

COVER
Merwin Meadows Dam Removal
Norwalk River Watershed, Town of Wilton, Fairfield County, Connecticut

The Design Continuum

Design Objectives – 2010 NRCS Design

Primary Objective:

1. “provide fish passage”

Secondary Objectives

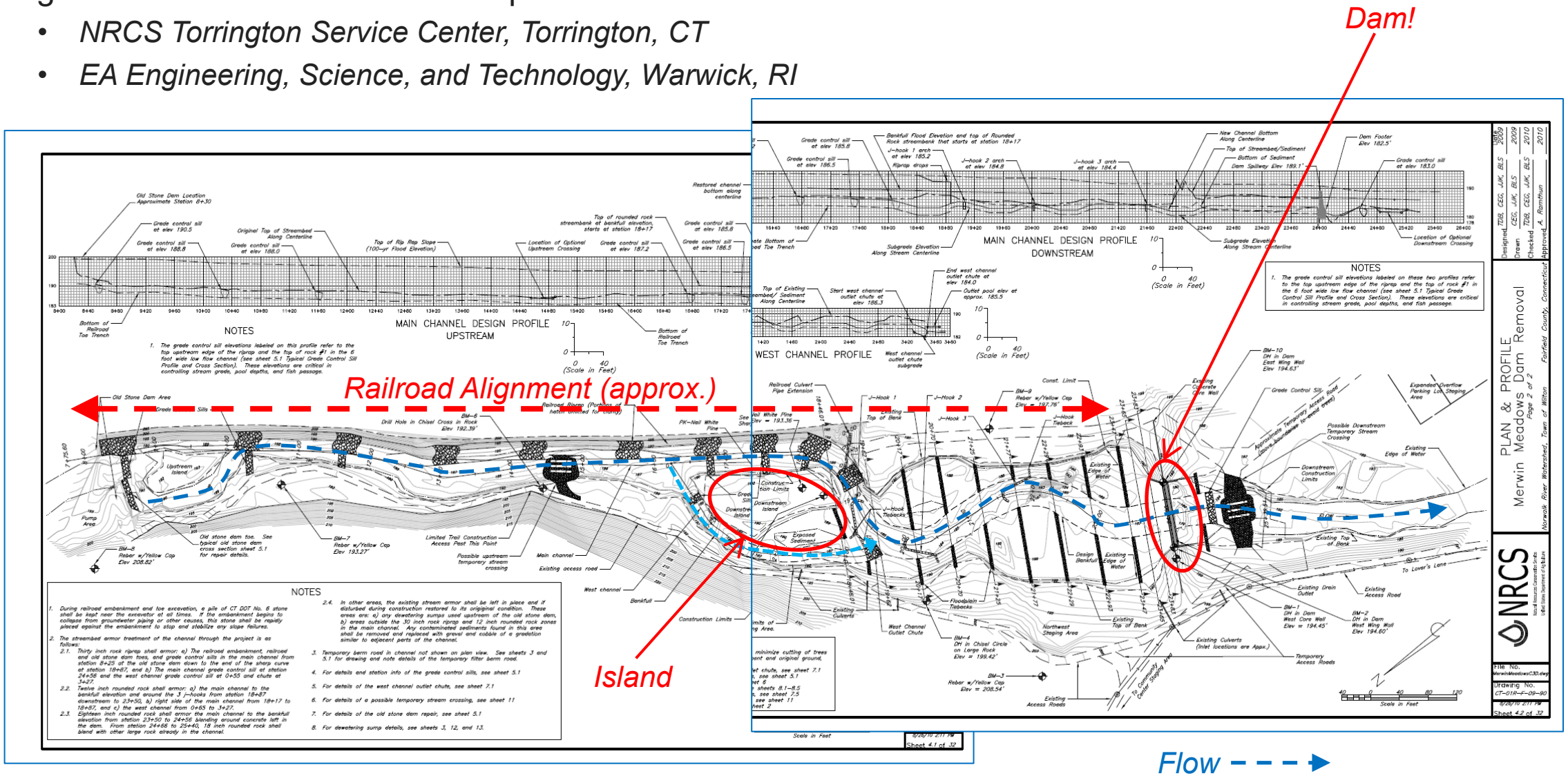
1. Remove contaminated sediment
2. Prevent piping of fine-grained material from railroad embankment
3. Reinforce the railroad embankment
4. Minimize disturbance
5. Stabilize the river grade
6. Make newly created channel as stable as upstream and downstream channel using rounded rock
7. Create a new floodplain
8. Minimize pollution during construction

2010 NRCS Design

Montage from Plan Sheet Nos. 4.1 and 4.2 of 32 from 2010 NRCS Plan Set

Design reflected the current state-of-practice – ***shout out to:***

- *NRCS Torrington Service Center, Torrington, CT*
- *EA Engineering, Science, and Technology, Warwick, RI*



2023 Build Design

2019 BOD

Design Objectives – 2023 Built Design: *2019 Preliminary Basis of Design*

Primary Goals:

1. Remove a public safety hazard
2. Reconnect ecosystem services between the riverine and estuarine environments
3. Restore natural biotic and abiotic fluxes…to enhance the aquatic ecosystem

Secondary Goals

1. Minimize long-term site maintenance costs
2. Provide opportunities to enhance public recreation
3. Provide educational opportunities

Design Objectives and Criteria

1. Protect the existing railroad embankment
2. Support development of a more natural channel morphology
3. Minimize disturbance to the upstream channel
4. Minimize the potential for uncontrolled release of sediment
5. Reduce Project construction costs relative to the 2010 NRCS Design

Design Objectives – 2010, 2019

2010 to 2019
What Changed?

2010 NRCS Design

Primary Objective

1. Provide fish passage

Secondary Objectives

1. Remove contaminated sediment
2. Prevent piping of fine-grained material from railroad embankment
3. Reinforce the railroad embankment
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2019 Basis of Design

Primary Goals

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Conclusion: Not a lot changed

…other than the presentation

Let's Revisit the Goals, Objectives and Criteria

2019 Basis of Design

Primary Goals

1. Remove a public safety hazard
2. Reconnect ecosystem services between the riverine and estuarine environments
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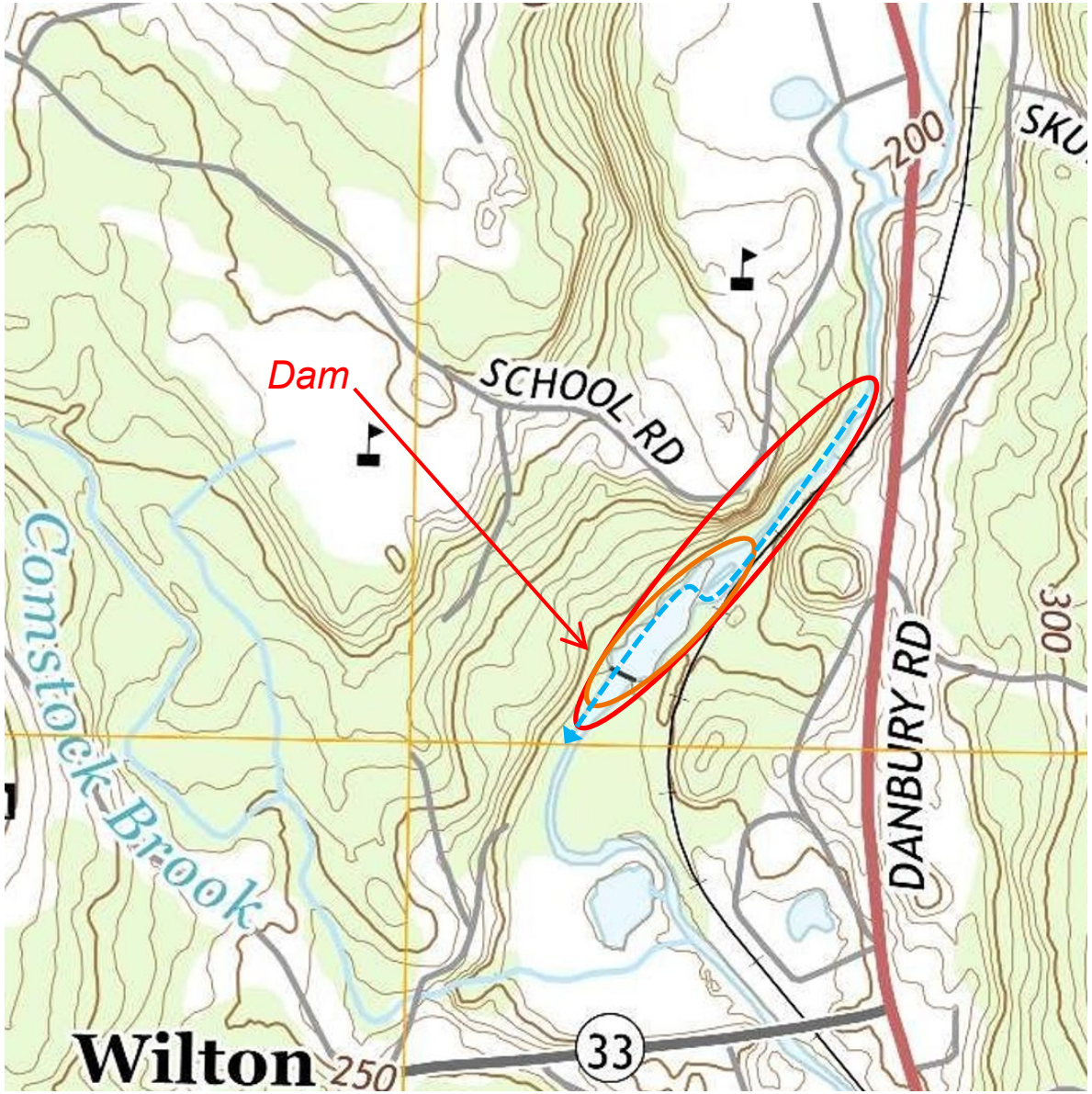
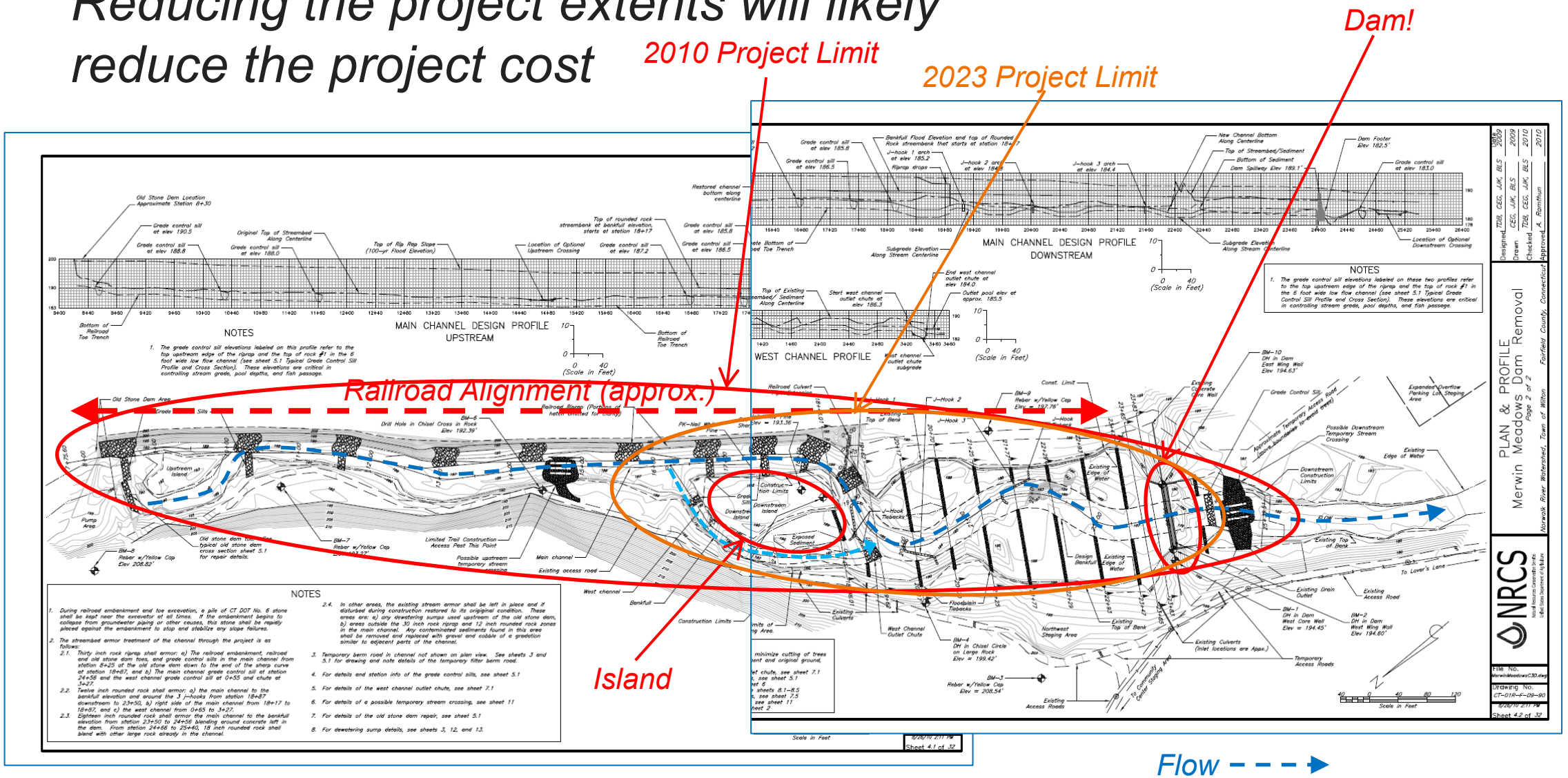


Revisiting a Previous Slide

Montage from Plan Sheet Nos. 4.1 and 4.2 of 32 from 2010 NRCS Plan Set

Reducing the project extents will likely reduce the project cost



Rolling it up: The Big Issues

Primary Constraints *(Opportunities?)*

Railroad Embankment

- 2010 NRCS Design – Protect the Railroad Embankment
- Opportunity:
  - The dam wasn't constructed to protect the railroad

Sediment Management

- 2010 NRCS Design – Remove ~7,500 CY of sediment and bring in ~7,500 CY of replacement material
- Opportunity:
  - The dam removal design and regulatory process has evolved

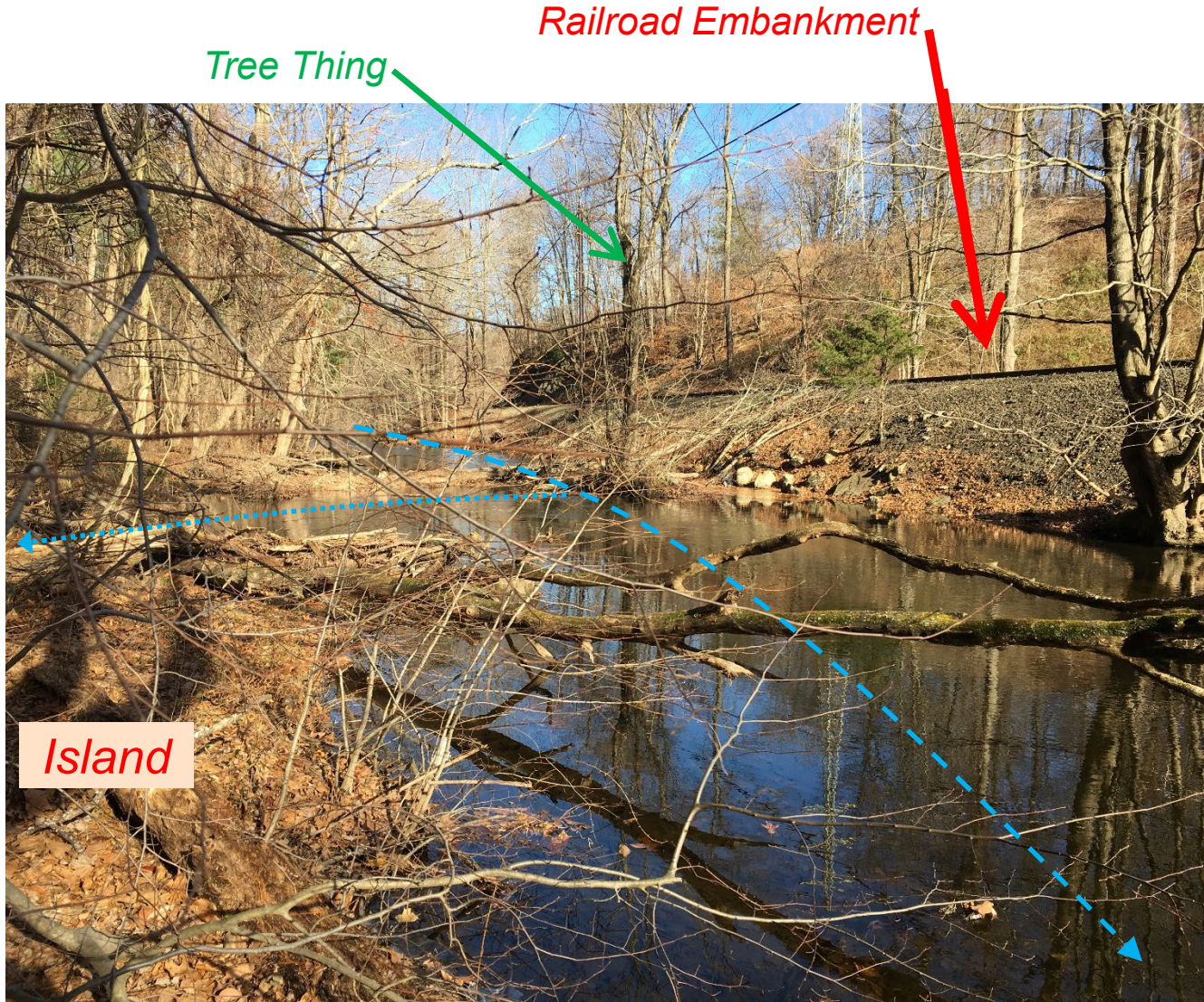
Train in Vain

Infrastructure

2019 BOD Conceptual Design

Conceptual Design Elements

1. Proposed Extent of Dam Removal
2. Proposed Channel Alignment
3. Aquatic Organism Passage
4. Protection of the Railroad Embankment
5. Sediment Management
6. Changes to Regulated Natural Resources
7. Construction Access & Staging
8. Construction-Phase Water & Sediment Management



Railroad Embankment

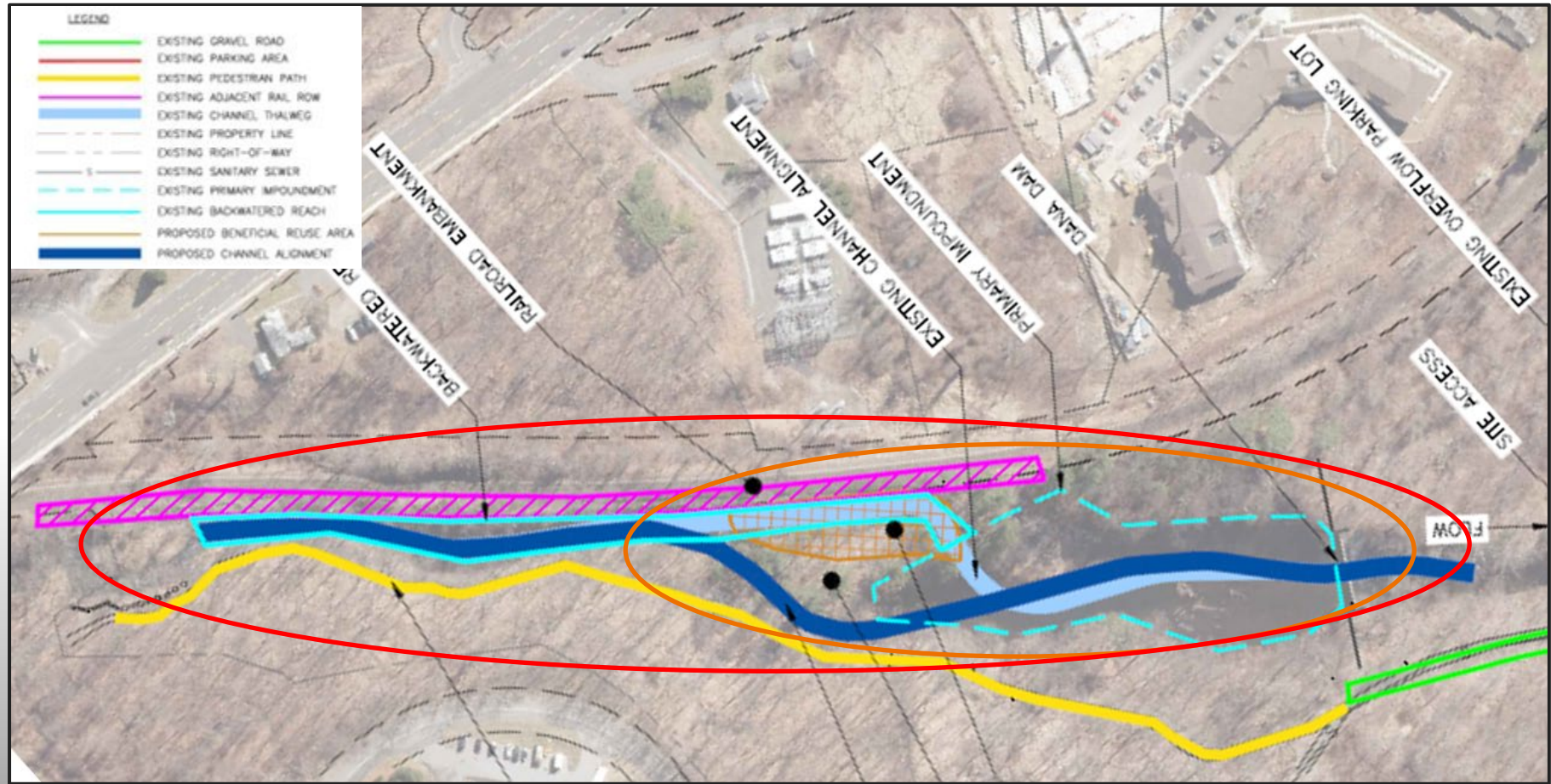
Railroad Embankment

- ~1,000 ft of Railroad Embankment along the river with…
- ~300 ft of embankment along the primary channel adjacent to an (anthropogenic) island
- CTDOT actively working on remedial actions

You can't move the railroad…

So why not move the river?

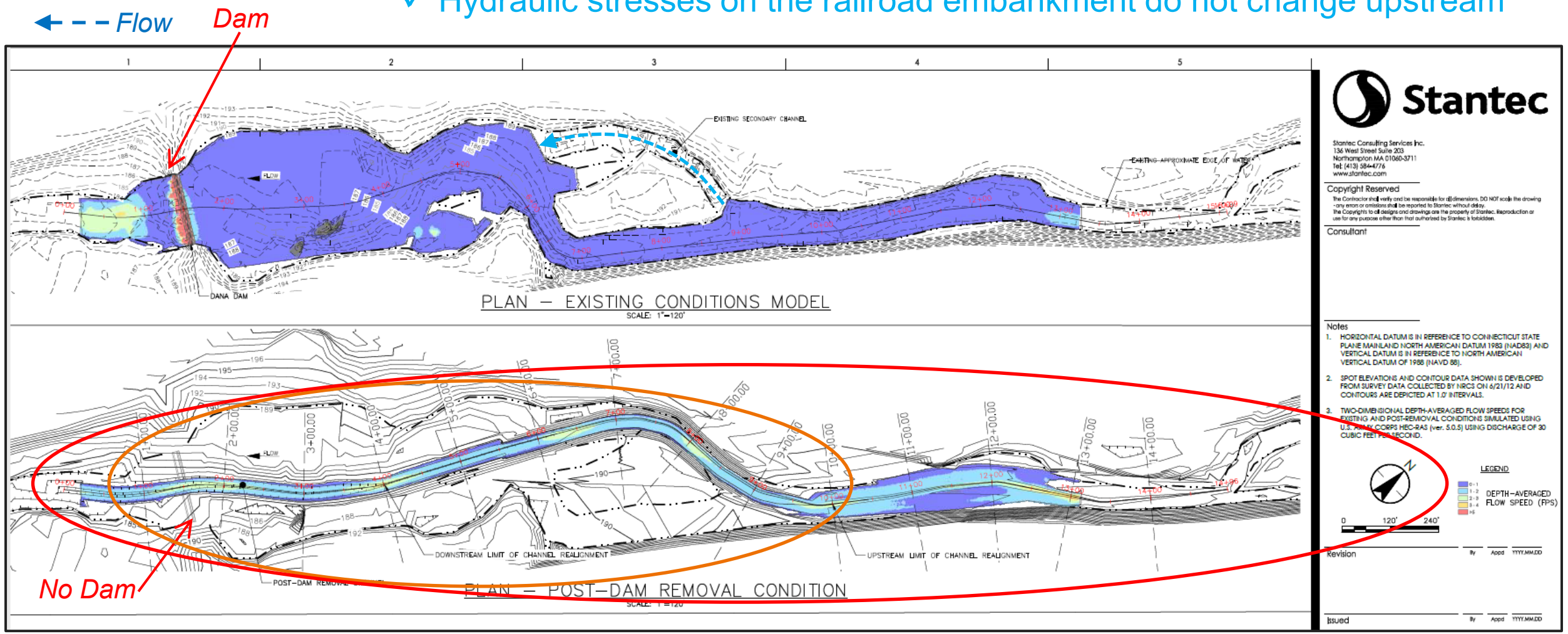
✓ Let's do it!



Another Realignment of the Norwalk River

Realign the River

- Move ~300 ft of river away from the railroad embankment
- "Hydraulic Similitude" upstream from the Project limit of work
  - ✓ Hydraulic stresses on the railroad embankment do not change upstream



Adjacent Infrastructure

Previous Approach to Infrastructure Dependencies

- Part of the Dam Removal Project

An Evolved Approach

- Identify Responsibilities and Collaborate
- Address Infrastructure as Part of the Dam Removal Project Process

Stuck in the Middle with You

Sediment Management

Sediment Management Requires Teamwork

- Lots of fieldwork
- Lots of desktop studies
- Lots of Coordination & Collaboration

Sample computer code for sediment management process:

For i = 1 to n ' note that "n" cannot be identified a priori

1. Coordinate and Collaborate<i>
2. Due Diligence / Review of Previous Materials<i>
3. Sediment Sampling and Analysis<i>
4. Reporting on Findings<i>
5. Alternatives Analyses<i>
6. Sediment Management Plan<i>

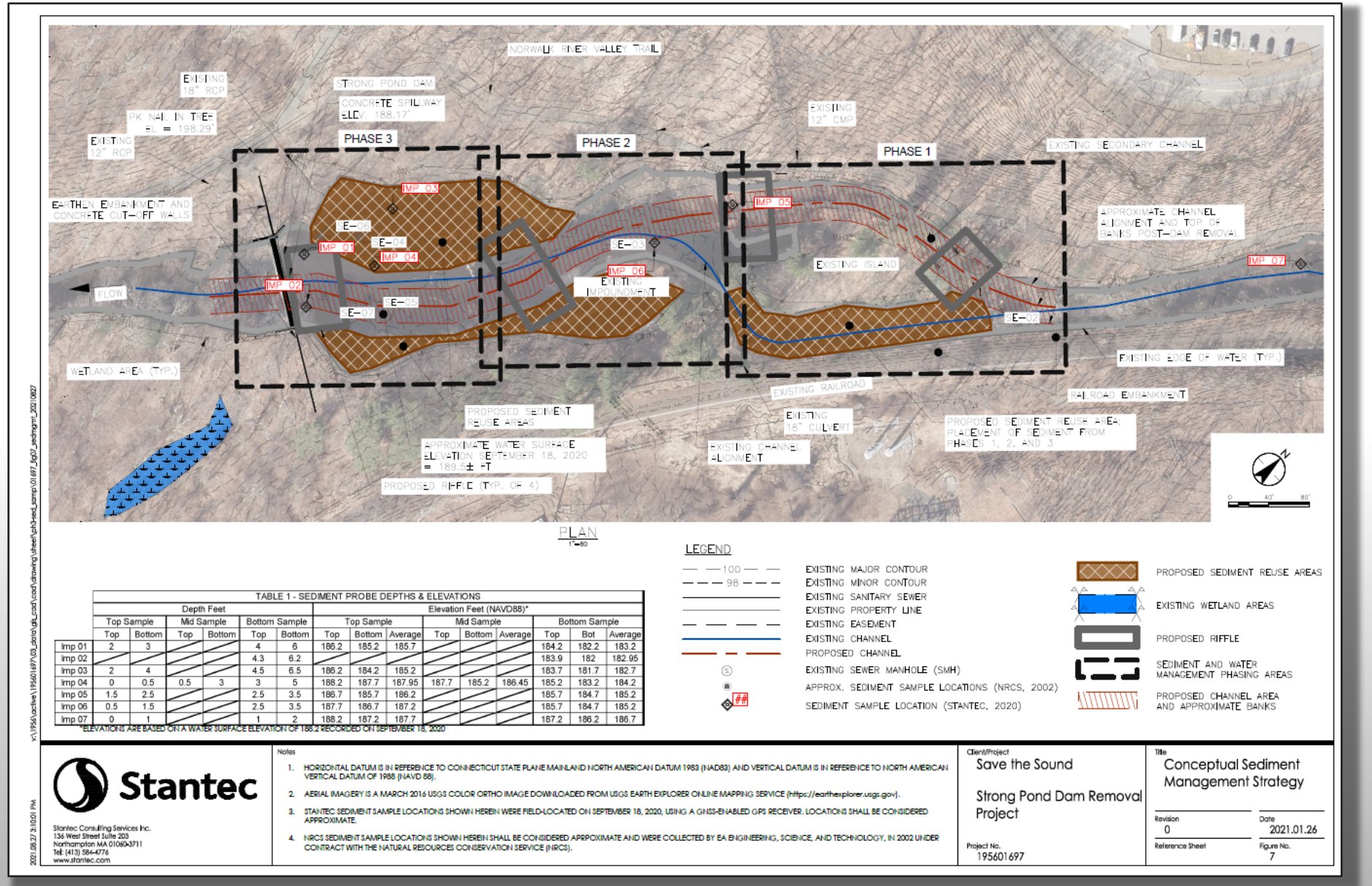
Next i

Sediment Management

Sediment Management Approach (Jan. 2022)

- Regulatory Framework – Project site does not meet the definition of an “Establishment” per CGS Section 221-134 et seq. (CT Transfer Act)
- Project is regulated by CT DEEP Dam Safety Division per CGS Section 22a.
- Sediment Management Alternatives
  1. Alternative 1 - Off-Site Disposal
  2. Alternative 2 - Segregate Sediment with Limited Off-Site Disposal
  3. Alternative 3 – On-Site Sediment Management *(spoiler alert)*
  4. Alternative 4 – Administrative Management Plan and Restricted Access

Sediment Management Trends in Dam Removal



PLAN
1"=80'

TABLE 1 - SEDIMENT PROBE DEPTHS & ELEVATIONS

	Depth Feet						Elevation Feet (NAVD88)*								
	Top Sample		Mid Sample		Bottom Sample		Top Sample			Mid Sample			Bottom Sample		
	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom	Average	Top	Bottom	Average	Top	Bot	Average
Imp 01	2	3			4	6	186.2	185.2	185.7				184.2	182.2	183.2
Imp 02					4.3	6.2							183.9	182	182.95
Imp 03	2	4			4.5	6.5	186.2	184.2	185.2				183.7	181.7	182.7
Imp 04	0	0.5	0.5	3	3	5	188.2	187.7	187.95	187.7	185.2	186.45	185.2	183.2	184.2
Imp 05	1.5	2.5			2.5	3.5	186.7	185.7	186.2				185.7	184.7	185.2
Imp 06	0.5	1.5			2.5	3.5	187.7	186.7	187.2				185.7	184.7	185.2
Imp 07	0	1			1	2	188.2	187.2	187.7				187.2	186.2	186.7

*ELEVATIONS ARE BASED ON A WATER SURFACE ELEVATION OF 188.2 RECORDED ON SEPTEMBER 18, 2020

LEGEND

- EXISTING MAJOR CONTOUR (100)
- EXISTING MINOR CONTOUR (98)
- EXISTING SANITARY SEWER
- EXISTING PROPERTY LINE
- EXISTING EASEMENT
- EXISTING CHANNEL
- PROPOSED CHANNEL
- EXISTING SEWER MANHOLE (SMH)
- APPROX. SEDIMENT SAMPLE LOCATIONS (NRCS, 2002)
- SEDIMENT SAMPLE LOCATION (STANTEC, 2020)
- PROPOSED SEDIMENT REUSE AREAS
- EXISTING WETLAND AREAS
- PROPOSED RIFFLE
- SEDIMENT AND WATER MANAGEMENT PHASING AREAS
- PROPOSED CHANNEL AREA AND APPROXIMATE BANKS

Stantec

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Notes
1. HORIZONTAL DATUM IS IN REFERENCE TO CONNECTICUT STATE PLANE MAINLAND NORTH AMERICAN DATUM 1983 (NAD83) AND VERTICAL DATUM IS IN REFERENCE TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
2. AERIAL IMAGERY IS A MARCH 2016 USGS COLOR ORTHO IMAGE DOWNLOADED FROM USGS EARTH EXPLORER ONLINE MAPPING SERVICE (https://earthexplorer.usgs.gov).
3. STANTEC SEDIMENT SAMPLE LOCATIONS SHOWN HEREIN WERE FIELD-LOCATED ON SEPTEMBER 18, 2020, USING A GNSS-ENABLED GPS RECEIVER. LOCATIONS SHALL BE CONSIDERED APPROXIMATE.
4. NRCS SEDIMENT SAMPLE LOCATIONS SHOWN HEREIN SHALL BE CONSIDERED APPROXIMATE AND WERE COLLECTED BY EA ENGINEERING, SCIENCE, AND TECHNOLOGY, IN 2002 UNDER CONTRACT WITH THE NATURAL RESOURCES CONSERVATION SERVICE (NRCS).

Client/Project: Save the Sound
Strong Pond Dam Removal Project
Project No. 195601697

Title: Conceptual Sediment Management Strategy
Revision: 0
Date: 2021.01.26
Reference Sheet
Figure No. 7

Dam removal projects have trended towards “instream sediment management” (ISM)

This project reflects a step backwards from ISM...

And a step to the side relative to removing and replacing material.

Lesson:

Be prepared to adapt

Scarlet Begonias –
Fire on the Mountain

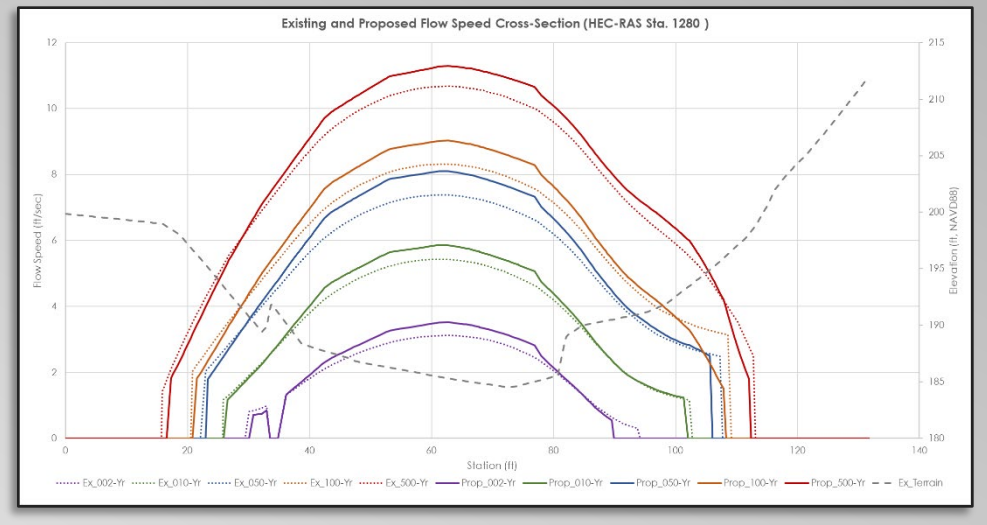
Putting the Pieces Together

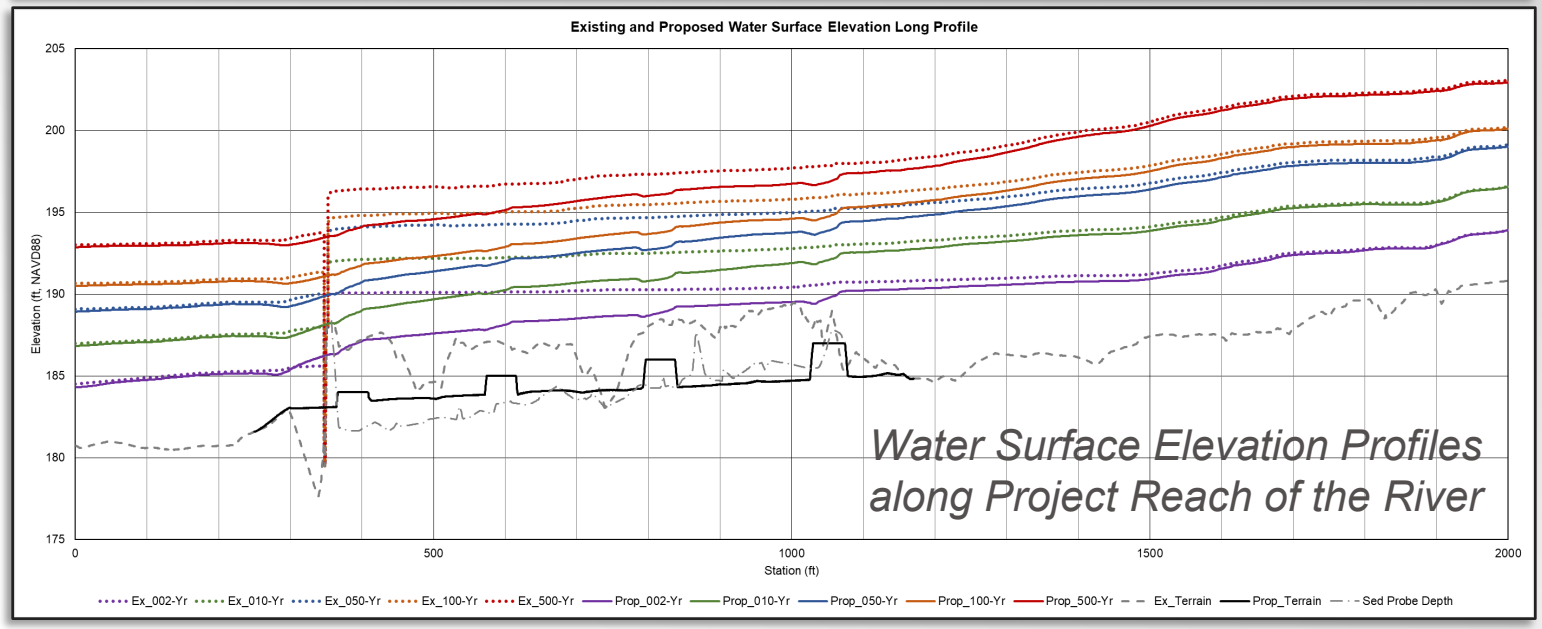
Key Element: "Hydraulic Similitude"

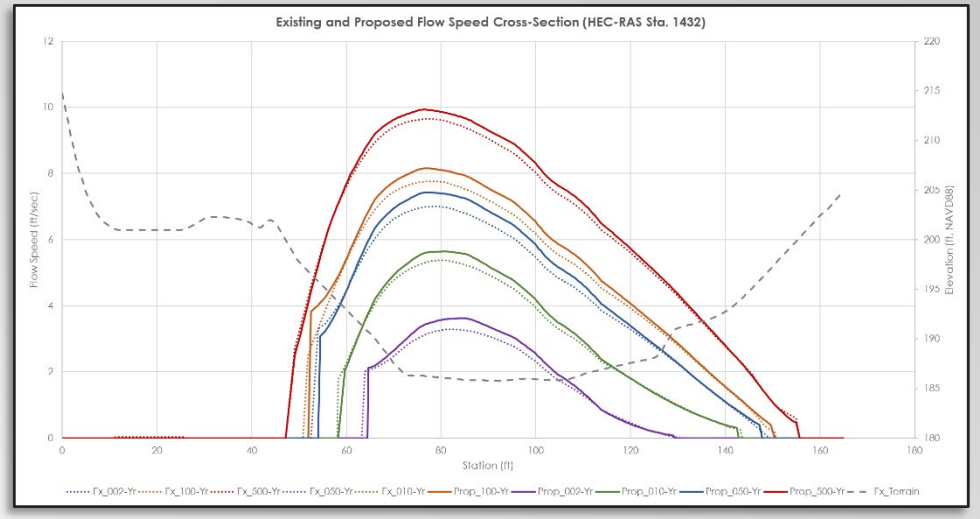
Sounds cool, right?

It means "*Don't change conditions along the railroad embankment*"

Flow Speeds Sections along Embankment







Key Element: "Angular Rock"

What an ugly topic…but let's be realistic.

1. Equivalent stability for rounded rock requires a 30% increase in rock diameter.
2. This results in 30% increases material thickness and volumes.
3. Sourcing rounded rock is difficult and will cost more.
4. Example – "Dirty Riprap" installation at Pond Lily Dam Removal site

Pond Lily Dam Removal, West River, New Haven, CT

Arrows point to same trees.