

MIANUS CHAPTER TROUT UNLIMITED

**MIANUS RIVER PARK
STAMFORD
FAIRFIELD COUNTY, CONNECTICUT**

**MIANUS RIVER RESTORATION:
STREAM RESTORATION DESIGN**

July 12, 2023

Prepared For:
Mianus Chapter Trout Unlimited
P.O. Box 475
Wilton, Connecticut

Prepared By:
Trout Scapes River Restoration LLC
280 W. Kagy Boulevard, Suite D #310
Bozeman, MT 59715

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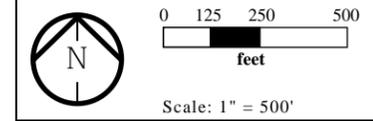
**Stamford
Fairfield County, Connecticut**

COVER SHEET

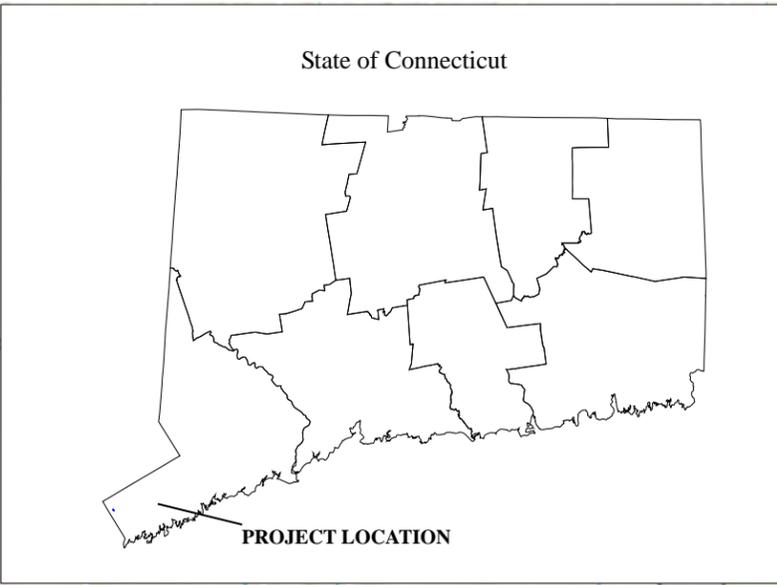
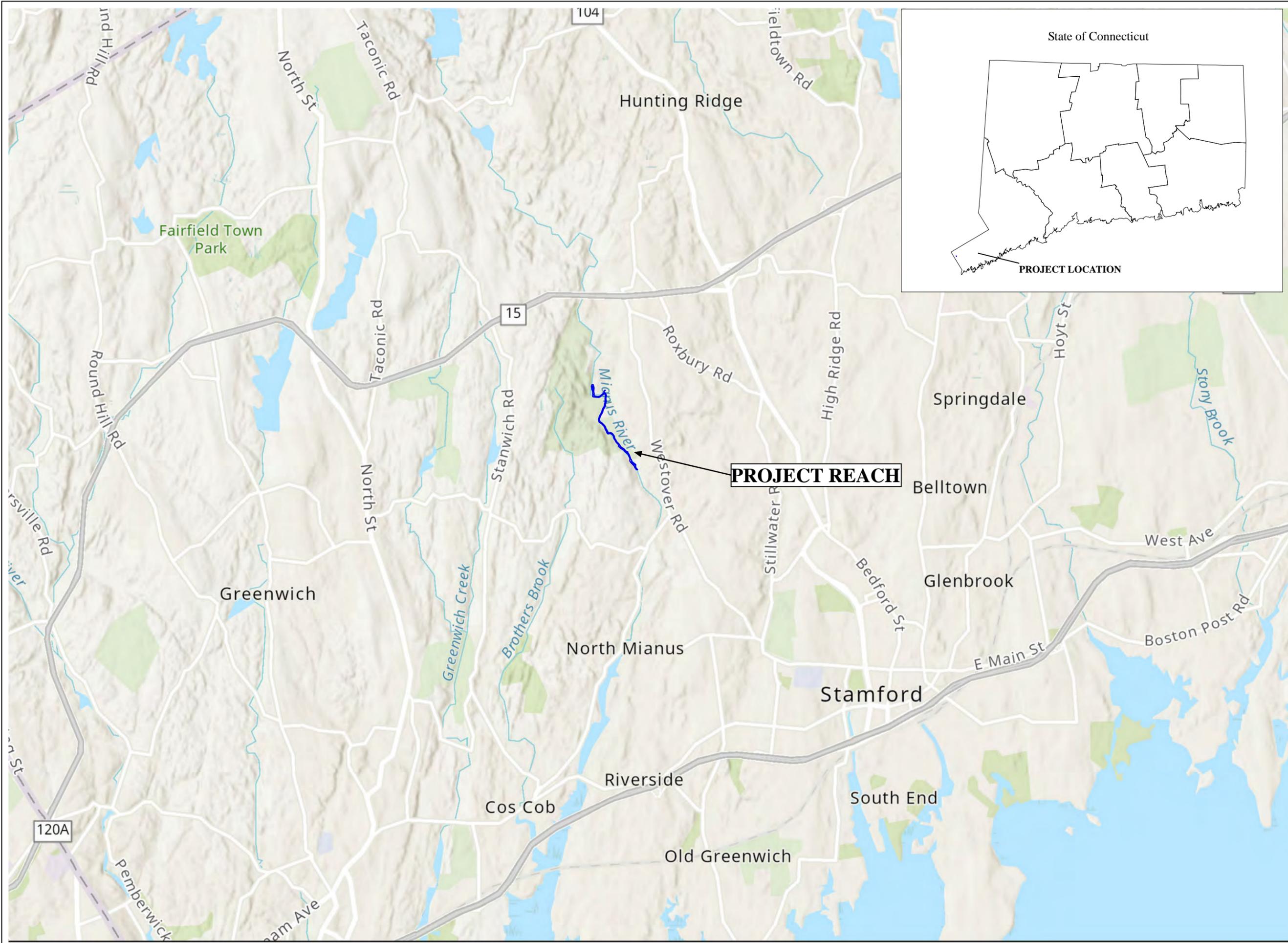
**ENGINEER SEAL
(WHEN APPLICABLE)**

NOTES

1. Survey Data Obtained from Topographic Survey by TSRR; June 16-18, 2022.
2. Survey References North American Vertical Datum 1988 (NAVD88).
3. Property Boundaries Approximate, not Survey Accurate.



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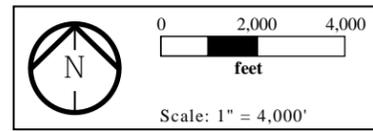
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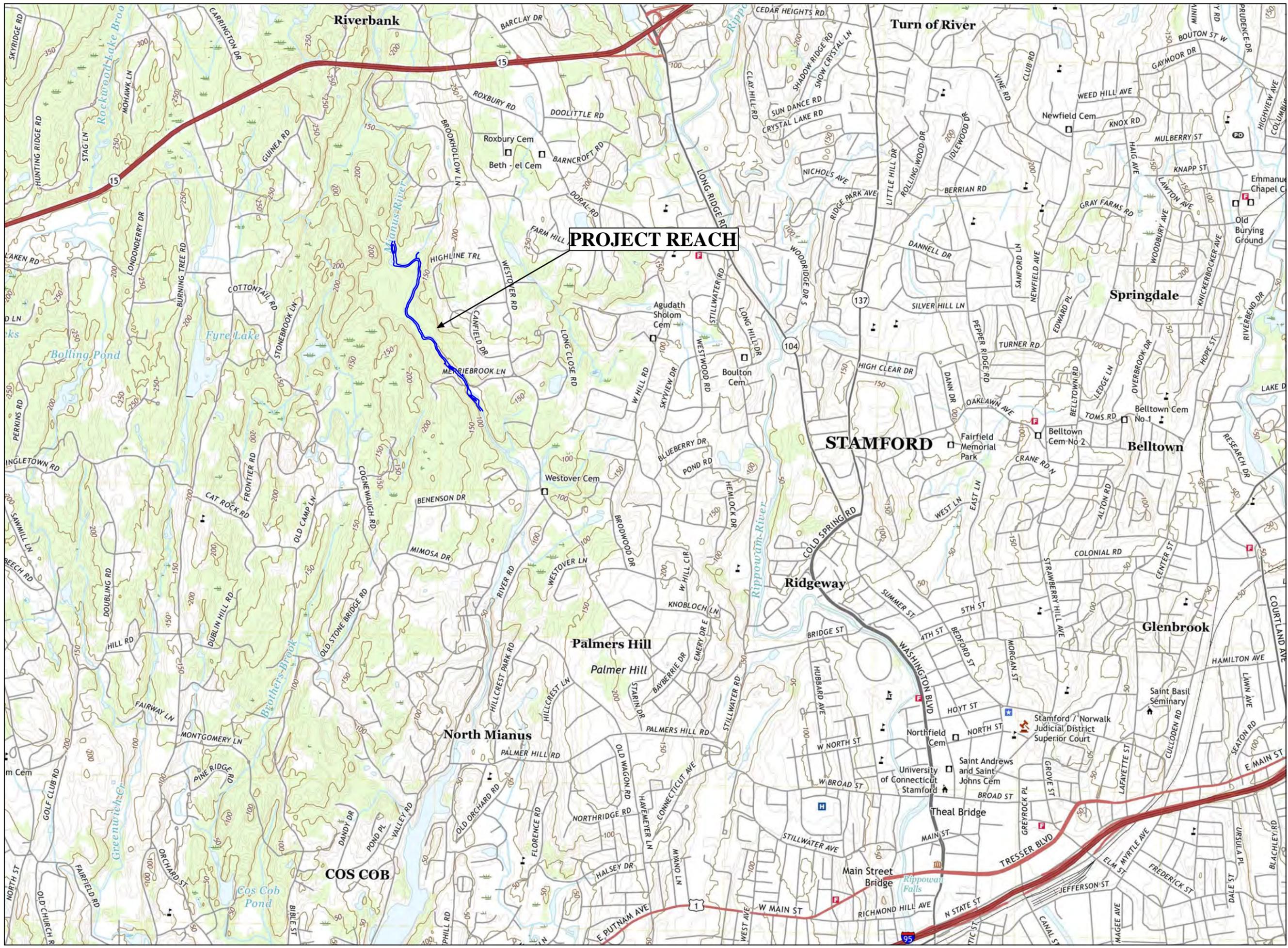
LOCATION MAP

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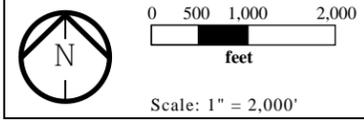
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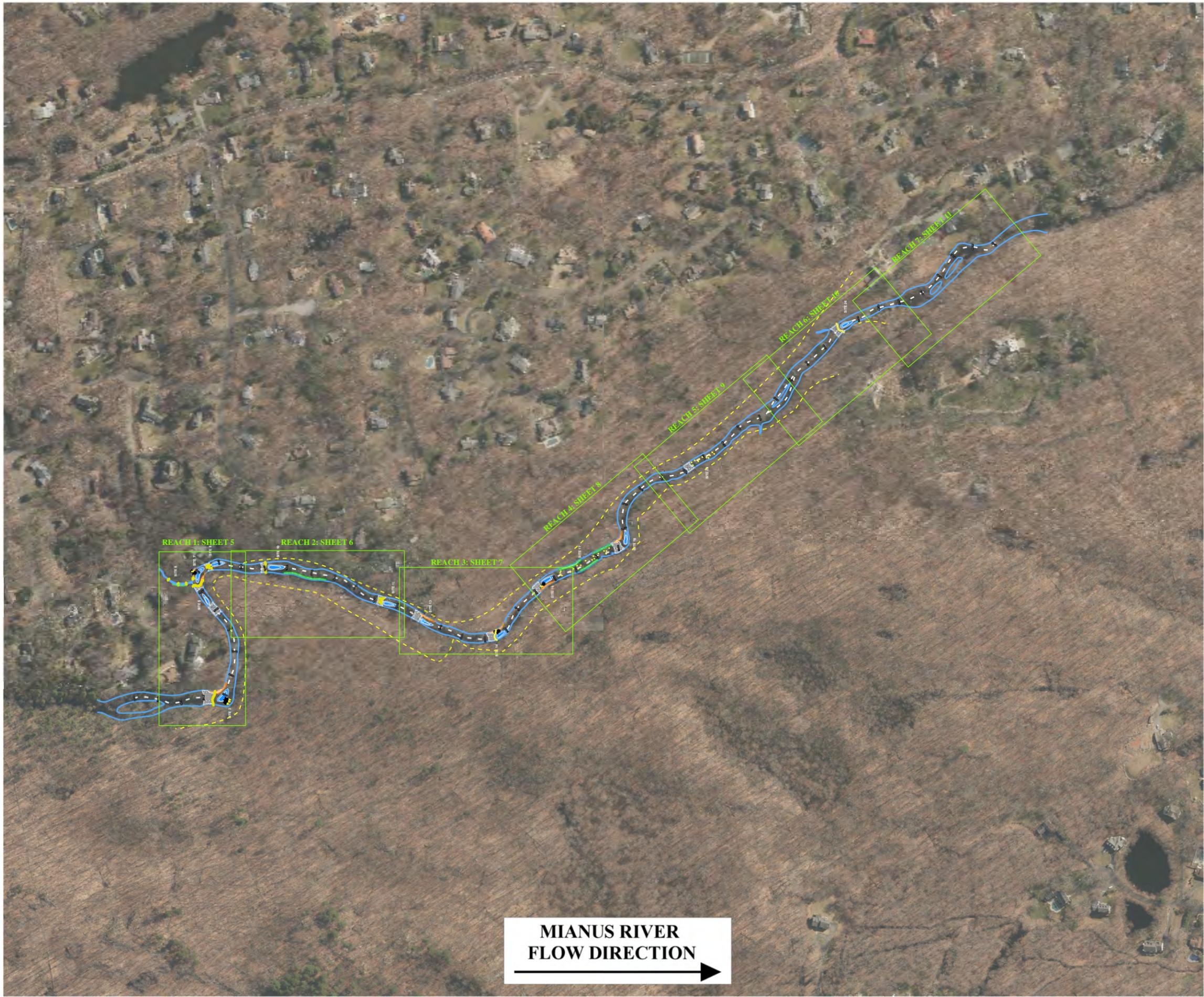
USGS TOPOGRAPHIC
MAP

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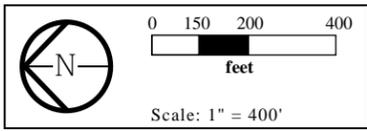
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**MIANUS RIVER
RESTORATION SITE
PLAN INDEX**

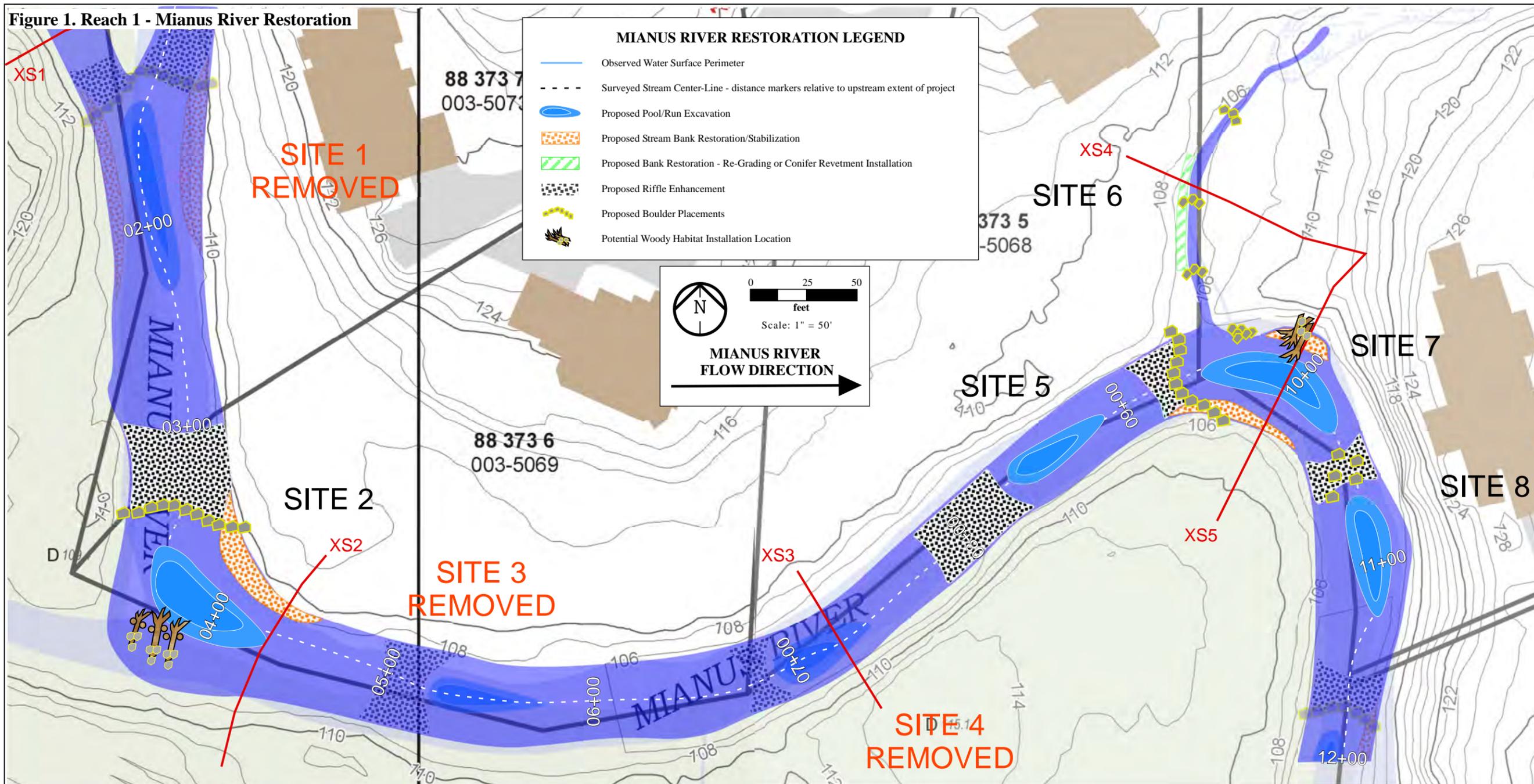
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Figure 1. Reach 1 - Mianus River Restoration



MIANUS RIVER RESTORATION LEGEND

- Observed Water Surface Perimeter
- Surveyed Stream Center-Line - distance markers relative to upstream extent of project
- Proposed Pool/Run Excavation
- Proposed Stream Bank Restoration/Stabilization
- Proposed Bank Restoration - Re-Grading or Conifer Revetment Installation
- Proposed Riffle Enhancement
- Proposed Boulder Placements
- Potential Woody Habitat Installation Location

0 25 50
feet
Scale: 1" = 50'

**MIANUS RIVER
FLOW DIRECTION**

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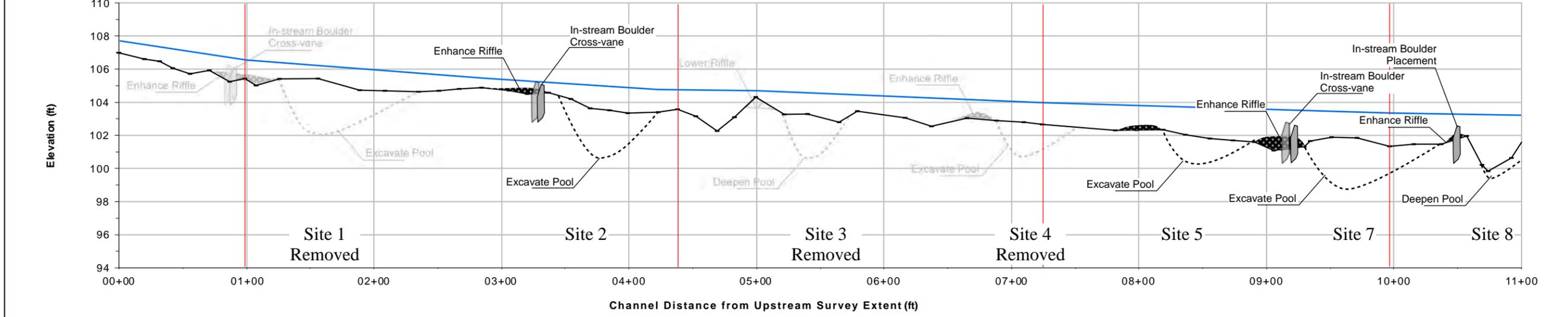
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**MIANUS RIVER
RESTORATION
REACH 1 SITE PLAN**

**ENGINEER SEAL
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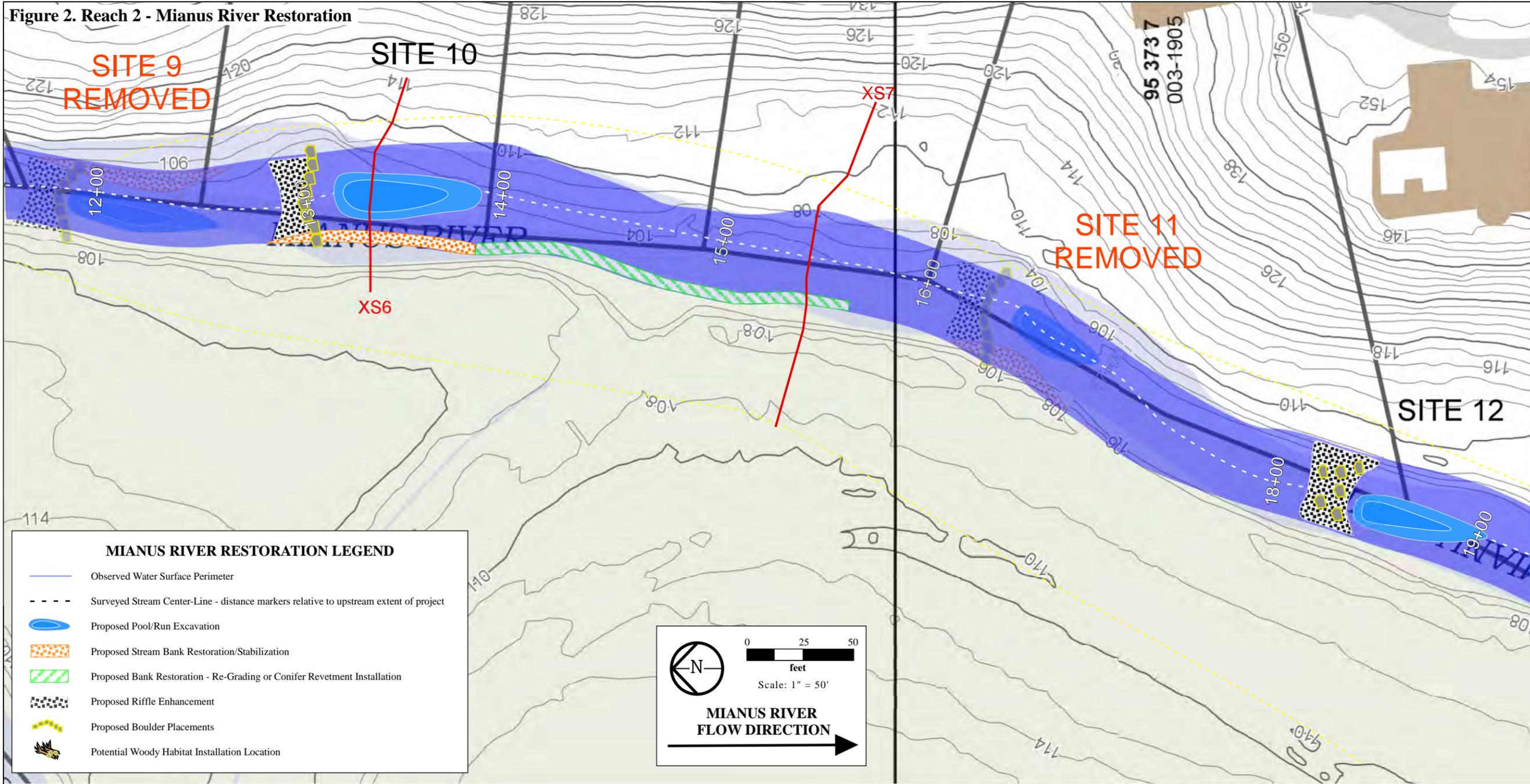
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MIANUS RIVER LONGITUDINAL PROFILE (00+00 - 11+00)



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Figure 2. Reach 2 - Mianus River Restoration



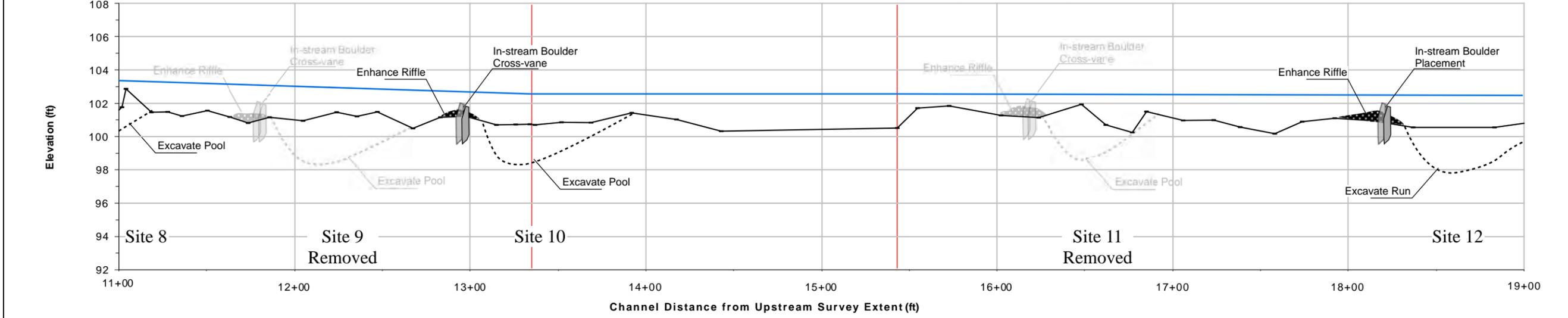
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- Proposed Boulder Placements
- Potential Woody Habitat Installation Location

0 25 50
feet
Scale: 1" = 50'

**MIANUS RIVER
FLOW DIRECTION**

MIANUS RIVER LONGITUDINAL PROFILE (11+00 - 19+00)



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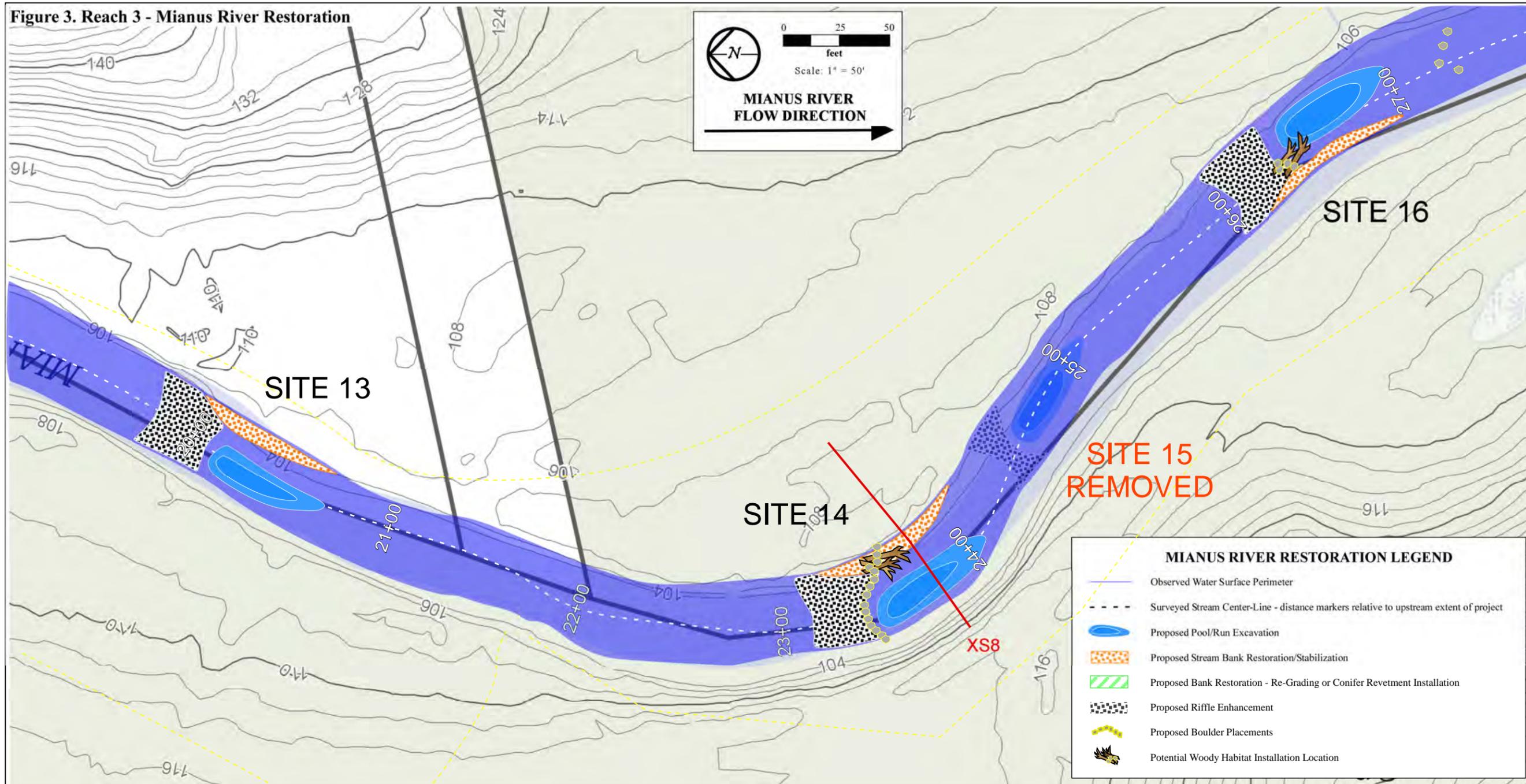
**MIANUS RIVER
RESTORATION
REACH 2 SITE PLAN**

**ENGINEER SEAL
(WHEN APPLICABLE)**

- NOTES**
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Figure 3. Reach 3 - Mianus River Restoration



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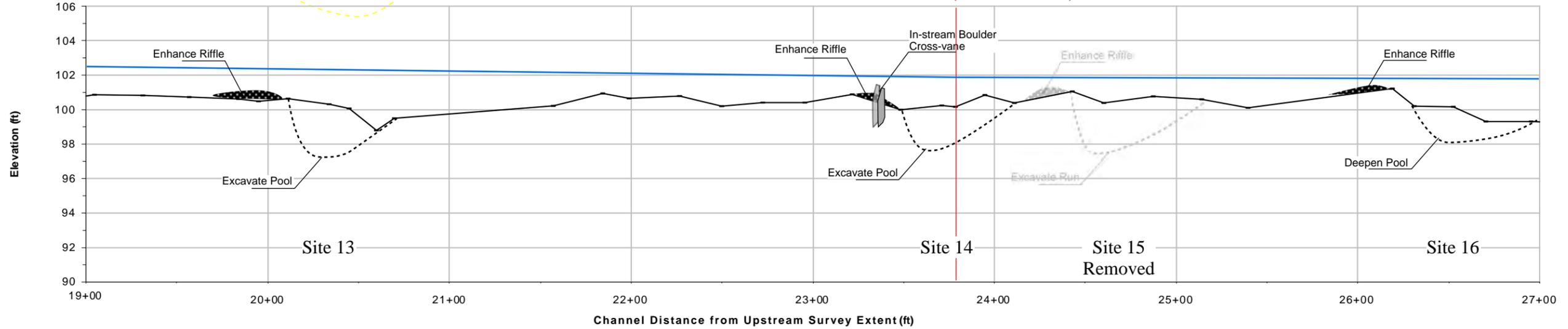
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MIANUS RIVER RESTORATION REACH 3 SITE PLAN

ENGINEER SEAL (WHEN APPLICABLE)

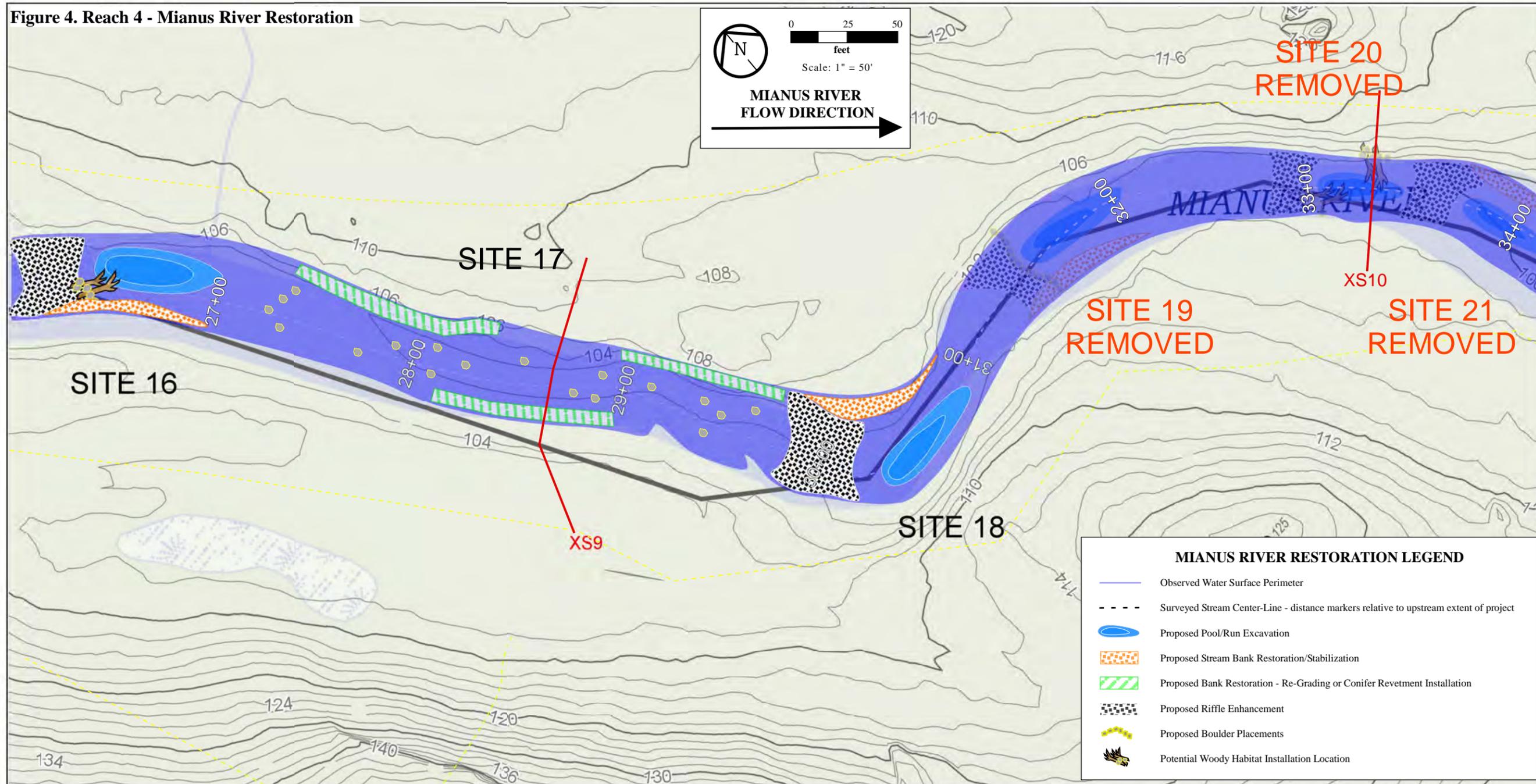
- NOTES**
- Survey Data Obtained from Topographic Survey by TSRR; June 16-18, 2022.
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MIANUS RIVER LONGITUDINAL PROFILE (19+00 - 27+00)



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Figure 4. Reach 4 - Mianus River Restoration



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MIANUS RIVER
RESTORATION
REACH 4 SITE PLAN

ENGINEER SEAL
(WHEN APPLICABLE)

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- Proposed Riffle Enhancement
- Proposed Boulder Placements
- Potential Woody Habitat Installation Location

MIANUS RIVER LONGITUDINAL PROFILE (27+00 - 34+00)

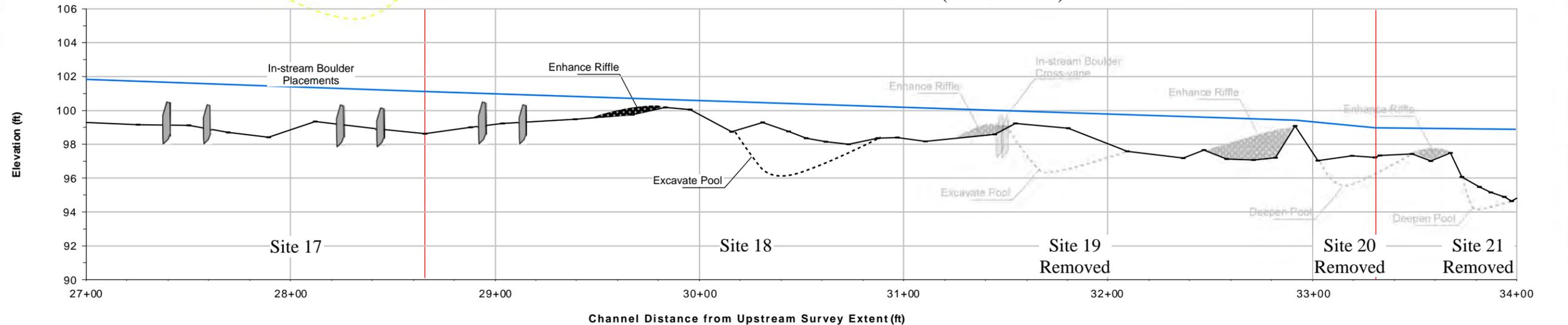


Figure 5. Reach 5 - Mianus River Restoration

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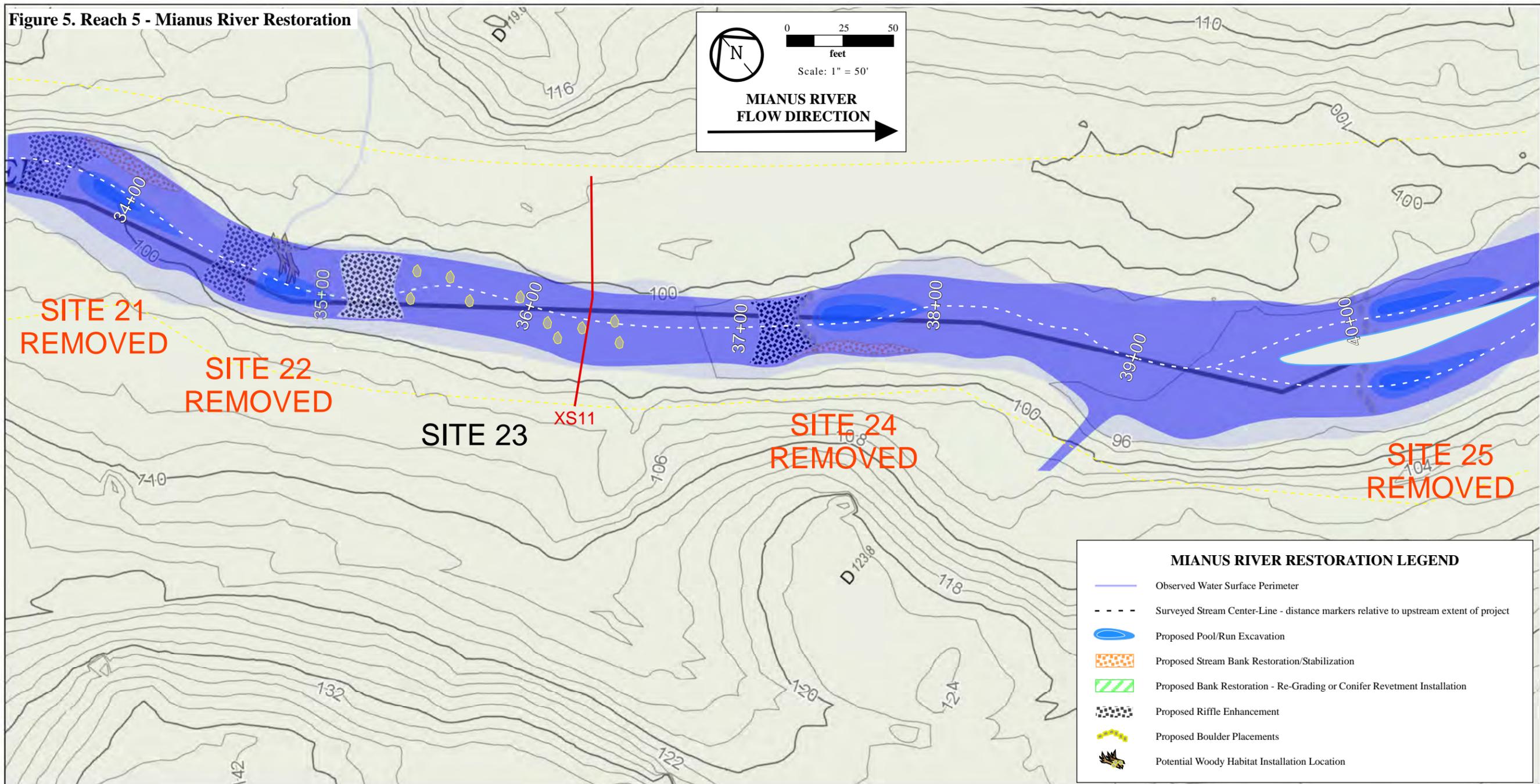
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**MIANUS RIVER
RESTORATION
REACH 5 SITE PLAN**

**ENGINEER SEAL
(WHEN APPLICABLE)**

- NOTES**
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MIANUS RIVER LONGITUDINAL PROFILE (34+00 - 41+00)

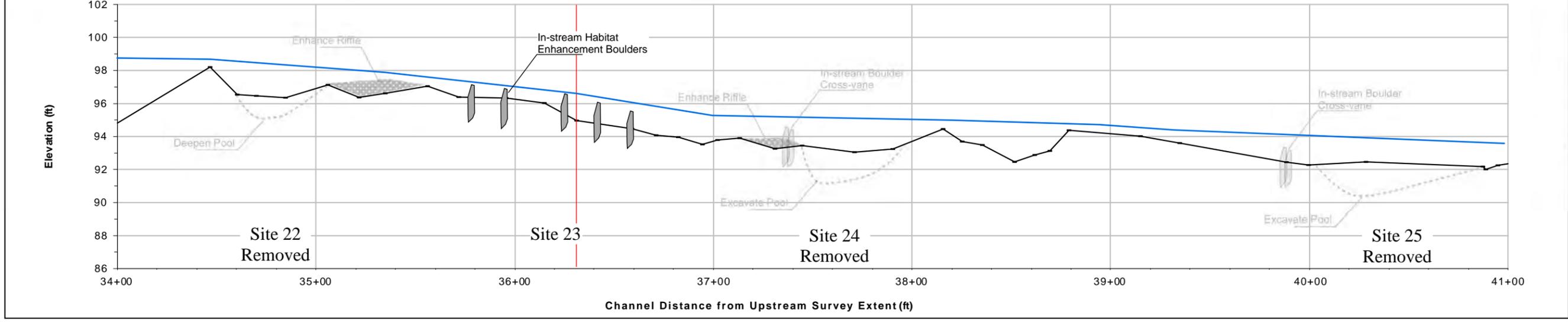
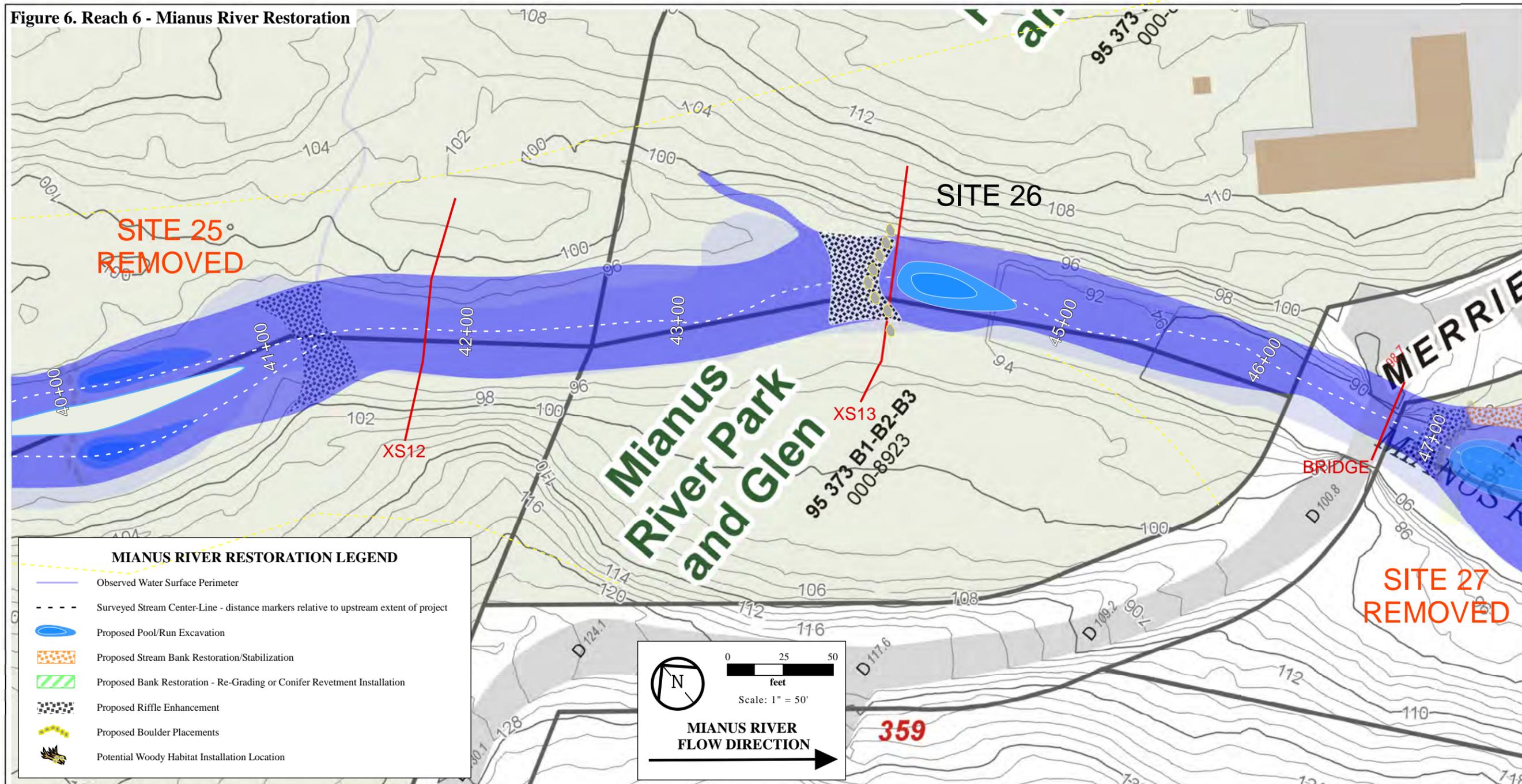
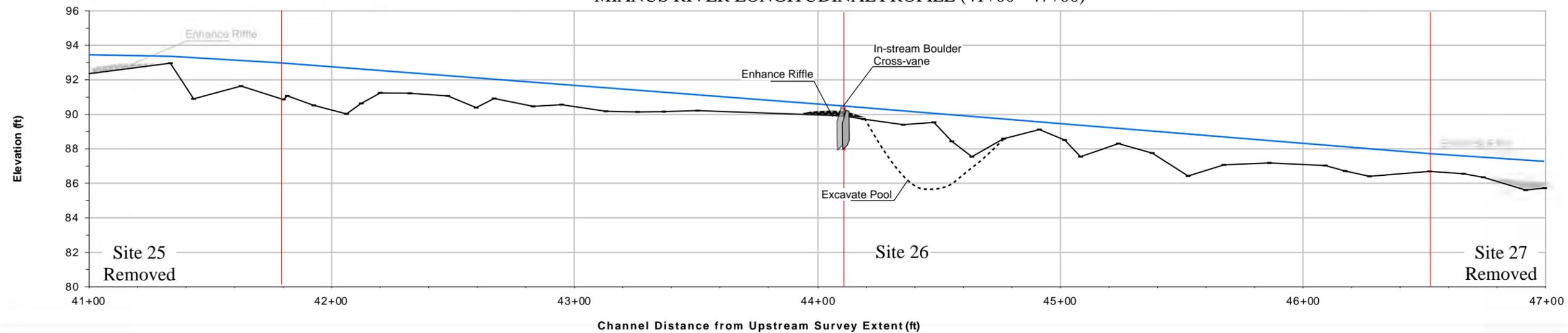


Figure 6. Reach 6 - Mianus River Restoration



MIANUS RIVER LONGITUDINAL PROFILE (41+00 - 47+00)



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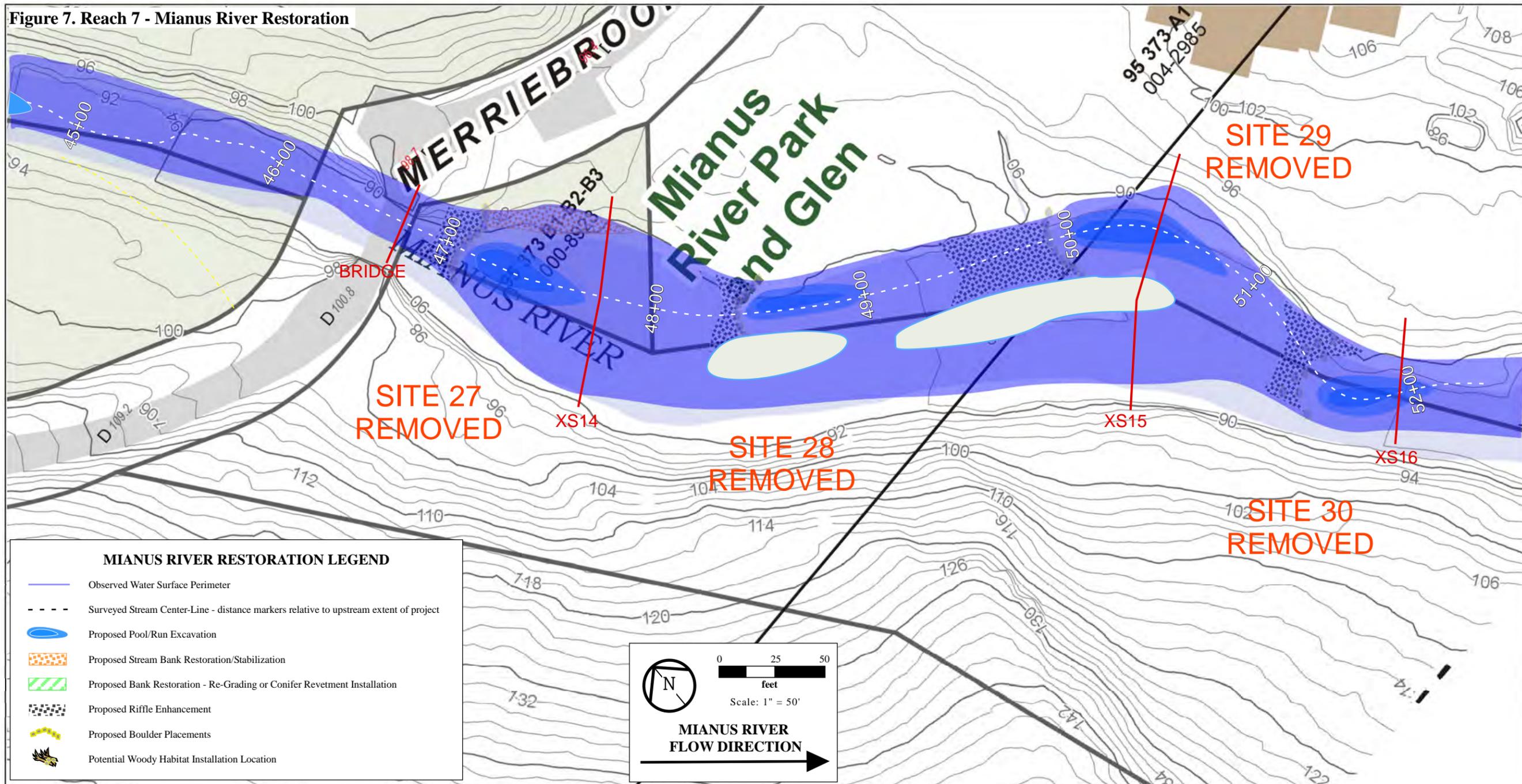
MIANUS RIVER
RESTORATION
REACH 6 SITE PLAN

ENGINEER SEAL
(WHEN APPLICABLE)

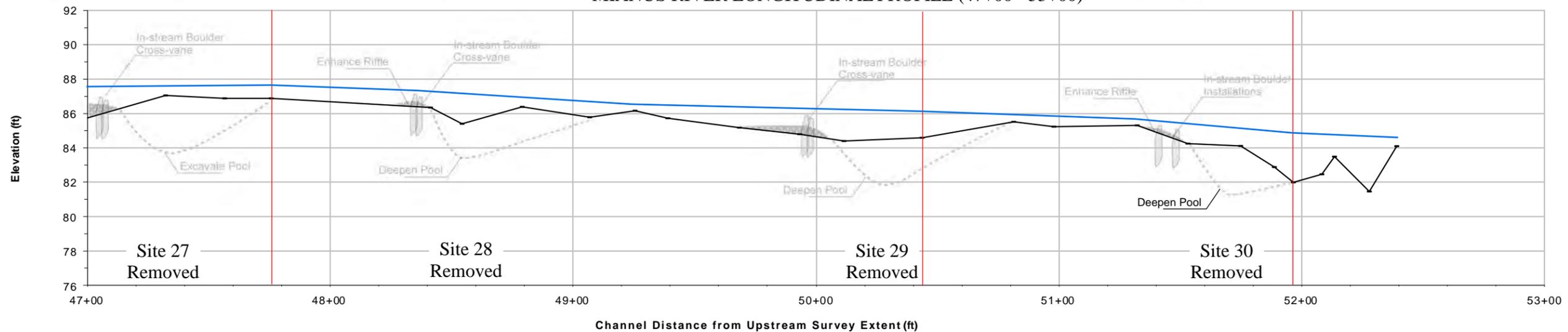
- NOTES**
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Figure 7. Reach 7 - Mianus River Restoration



MIANUS RIVER LONGITUDINAL PROFILE (47+00 - 53+00)



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MIANUS RIVER
RESTORATION
REACH 7 SITE PLAN

ENGINEER SEAL
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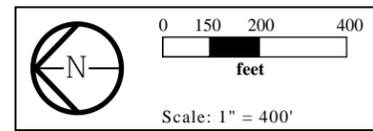
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**MIANUS RIVER
 RESTORATION
 CROSS-SECTION MAP**

ENGINEER SEAL
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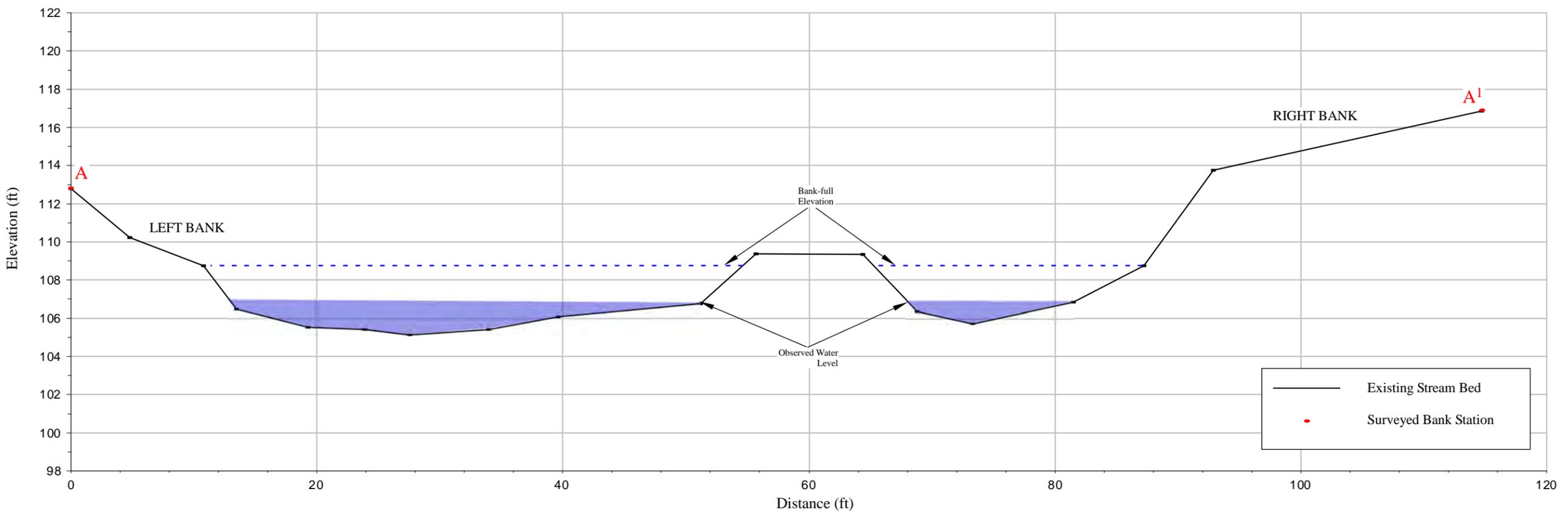
**MIANUS RIVER
RESTORATION
CROSS-SECTIONS
1 & 2**

ENGINEER SEAL
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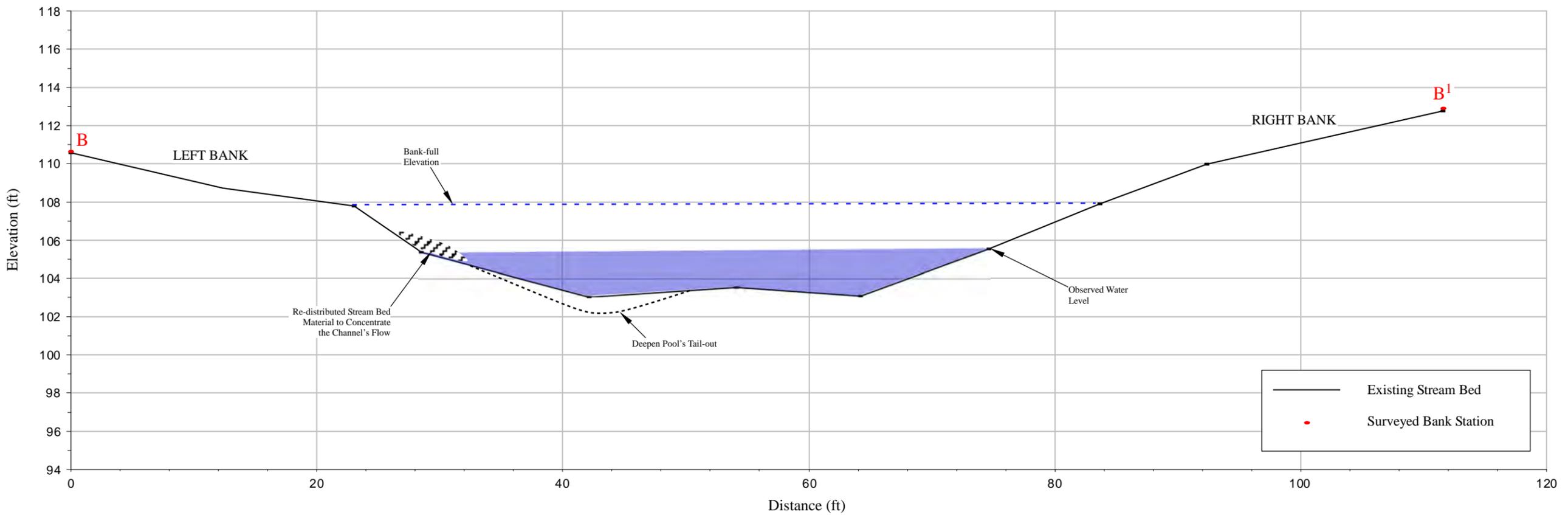
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Cross-section 1 A-A¹ (00+99)



Cross-section 2 B-B¹ (04+38): Restoration Site 2



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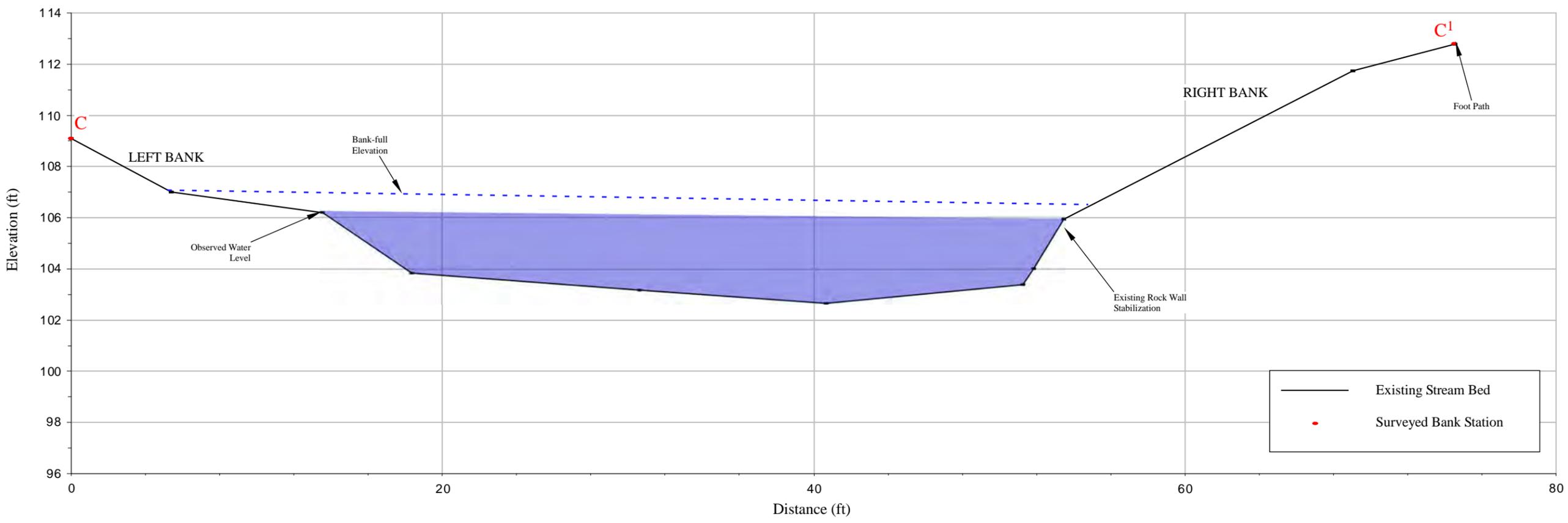
**MIANUS RIVER
RESTORATION
CROSS-SECTIONS
3 & 4**

ENGINEER SEAL
(WHEN APPLICABLE)

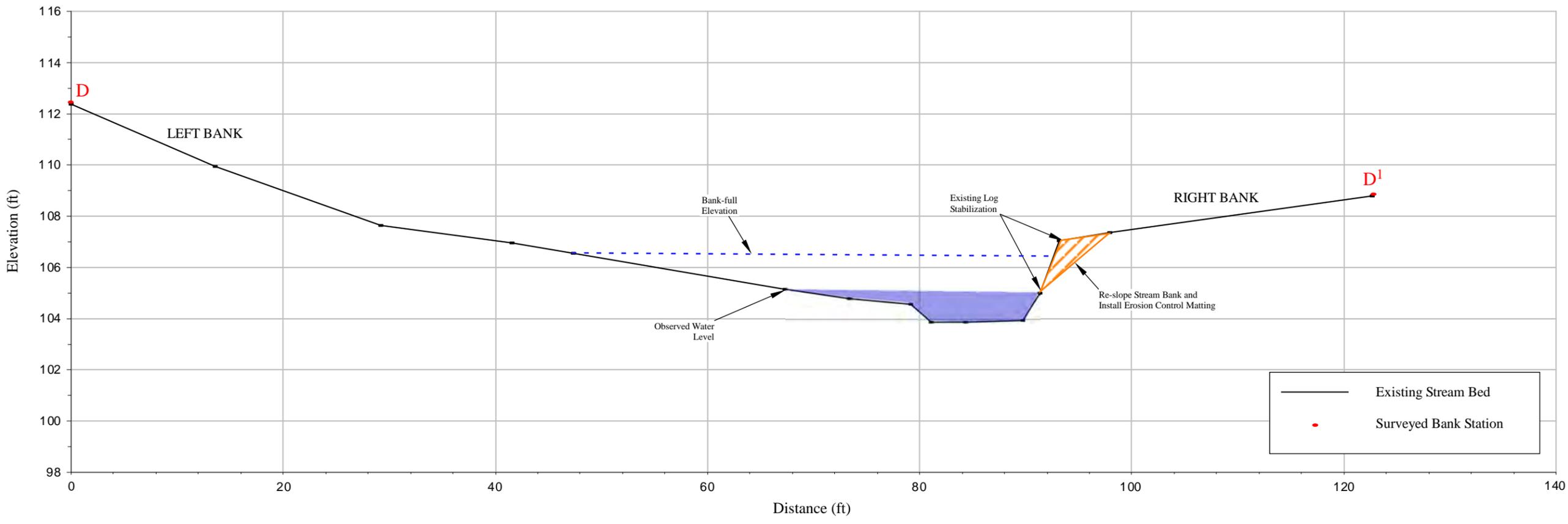
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Cross-section 3 C-C¹ (07+23)



Cross-section 4 D-D¹: Tributary Restoration Site 6



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**MIANUS RIVER
RESTORATION
CROSS-SECTIONS
5 & 6**

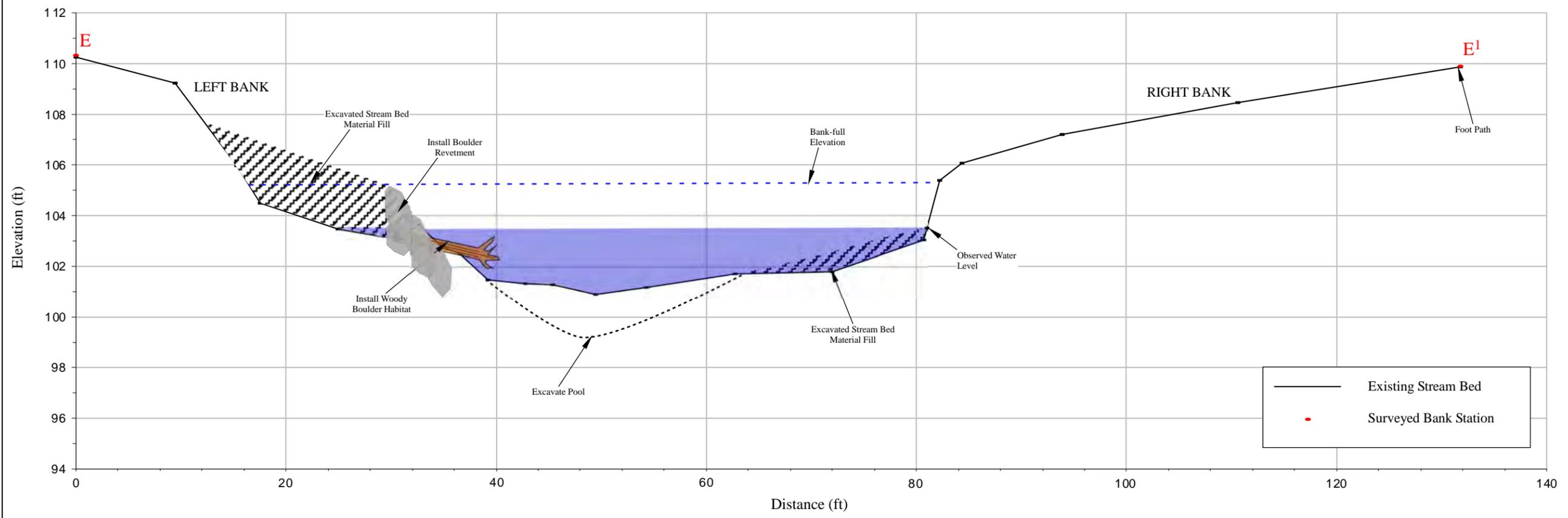
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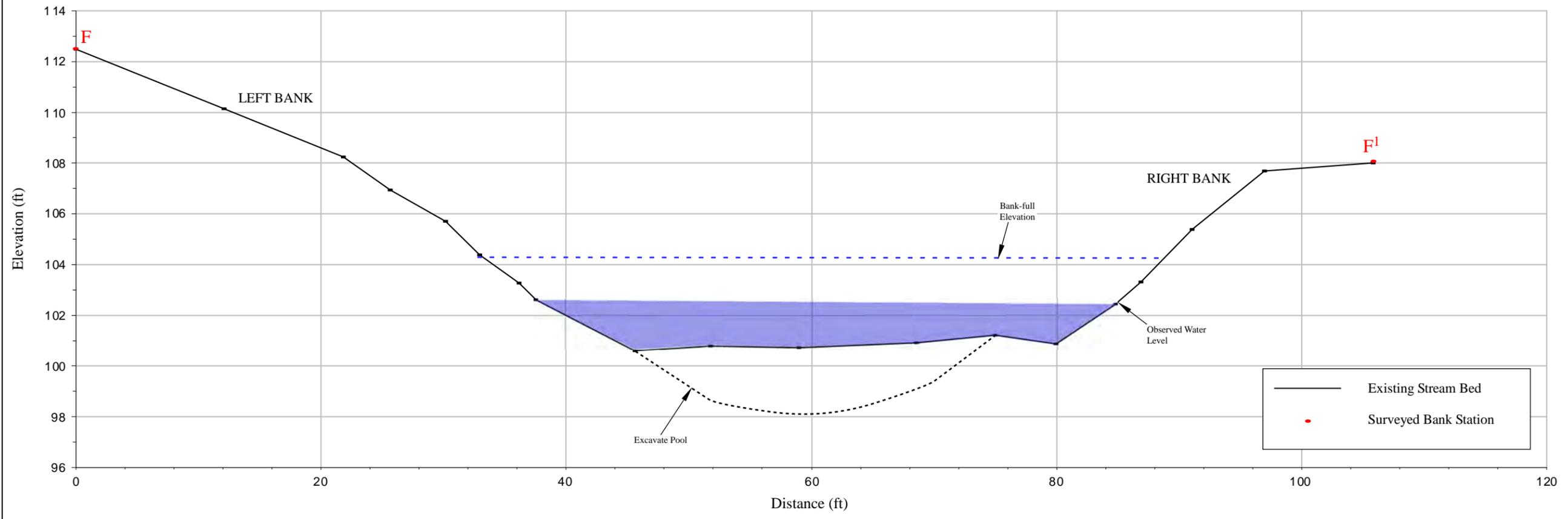
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Cross-section 5 E-E¹ (09+96): Restoration Site 7



Cross-section 6 E-F¹ (13+34): Restoration Site 10



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**MIANUS RIVER
RESTORATION
CROSS-SECTIONS
7 & 8**

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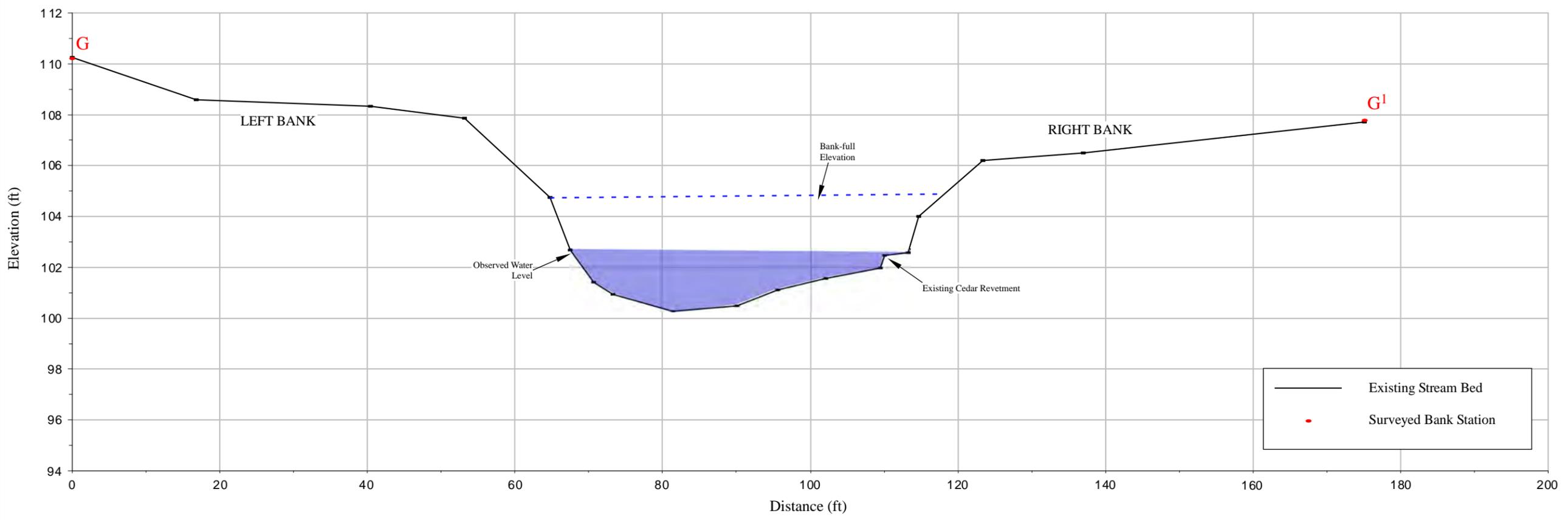
NOTES

- Survey Data Obtained from Topographic Survey by TSRR; June 16-18, 2022.
- Survey References North American Vertical Datum 1988 (NAVD88).

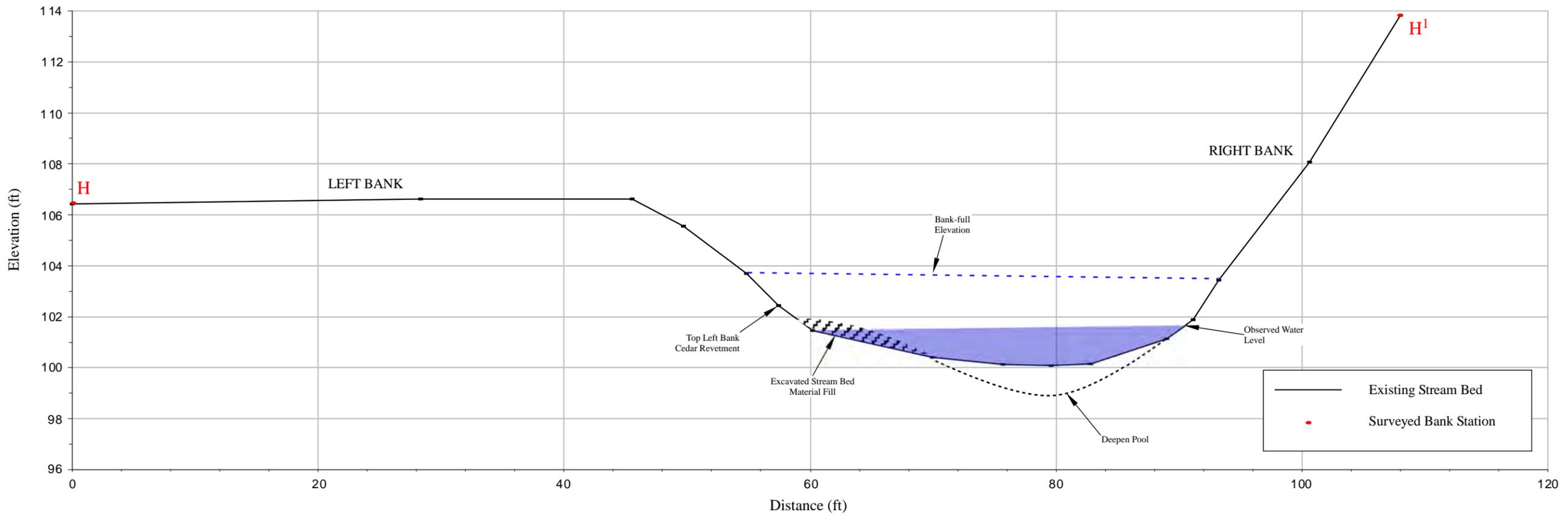
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SHEET: **16 of 28**

Cross-section 7 G-G¹ (15+43): Upstream Restoration Site 11



Cross-section 8 H-H¹ (23+78): Restoration Site 14



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RESTORATION
PROJECT DESIGN**

**Stamford
Fairfield County, Connecticut**

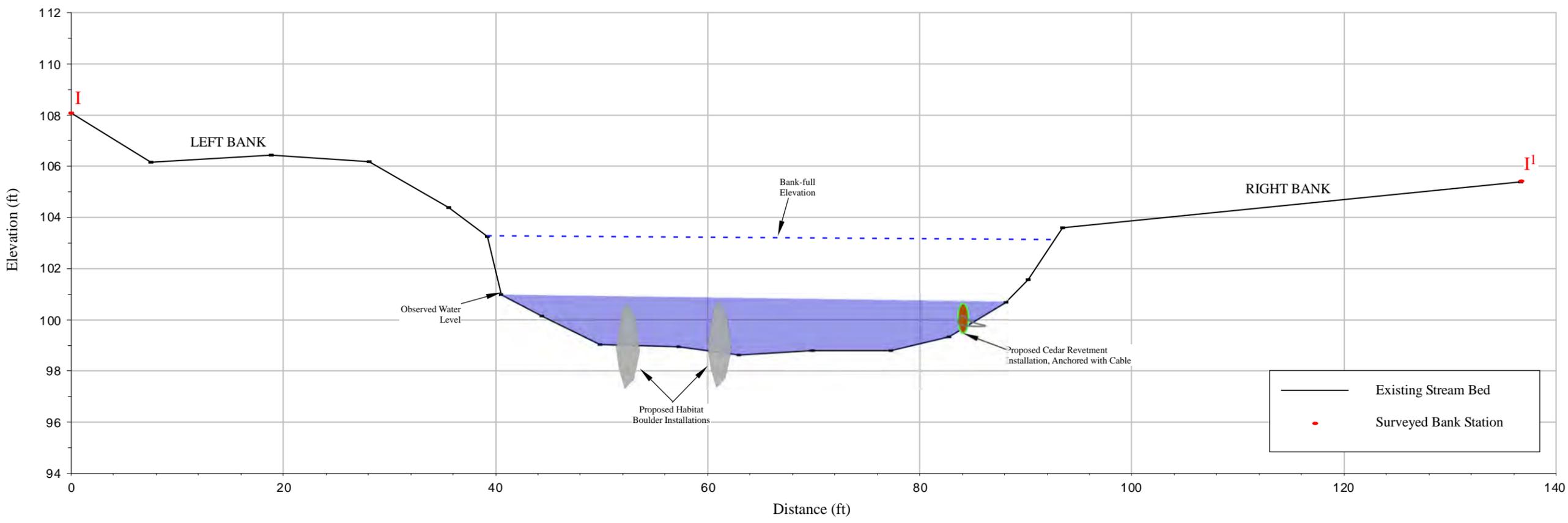
**MIANUS RIVER
RESTORATION
CROSS-SECTIONS
9 & 10**

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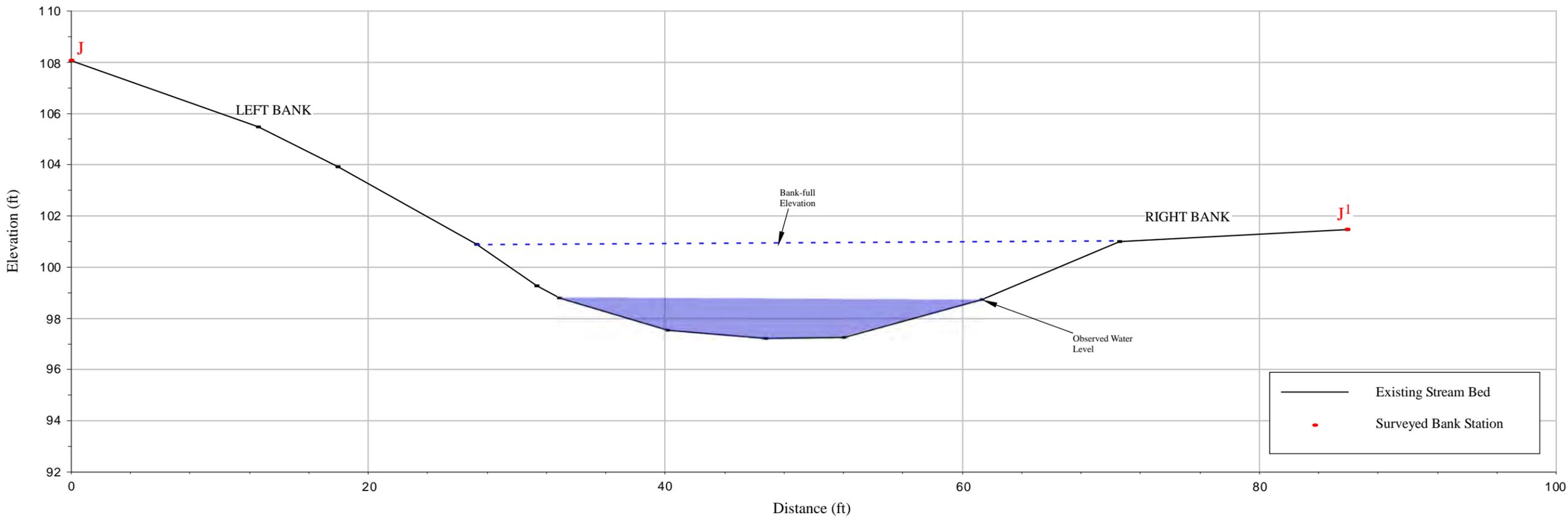
- NOTES**
- Survey Data Obtained from Topographic Survey by TSRR; June 16-18, 2022.
 - Survey References North American Vertical Datum 1988 (NAVD88).

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Cross-section 9 I-I¹ (28+66): Restoration Site 17



Cross-section 10 J-J¹ (33+31)



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**MIANUS RIVER
RESTORATION
PROJECT DESIGN**

**Stamford
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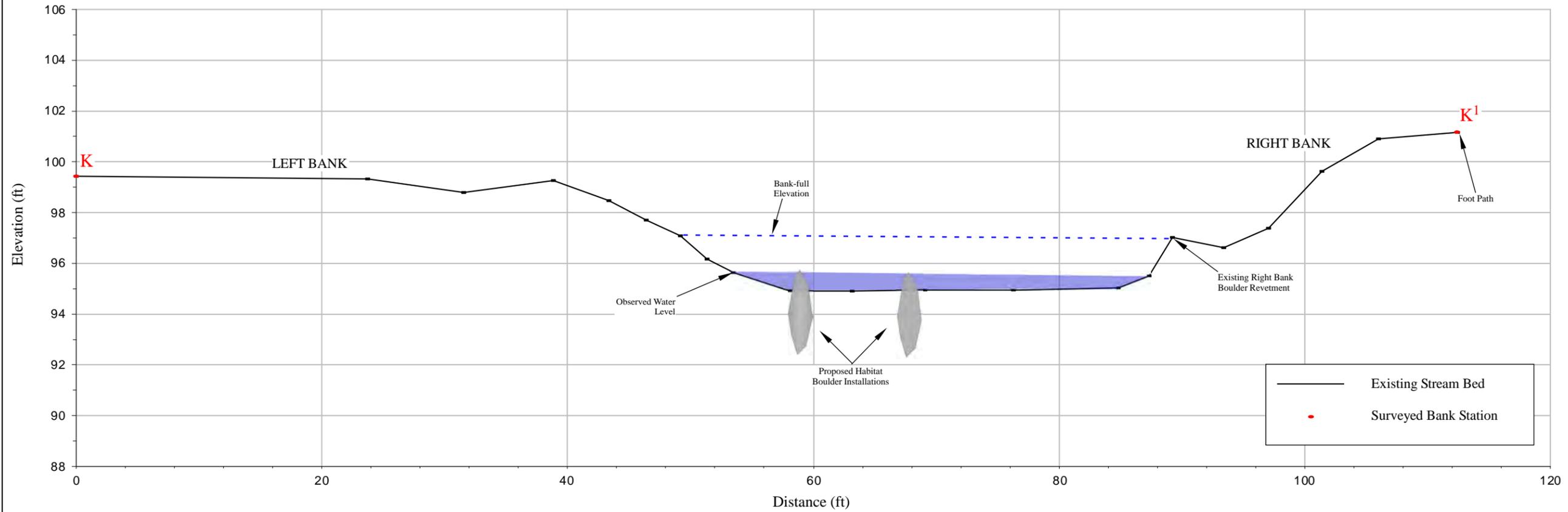
**MIANUS RIVER
RESTORATION
CROSS-SECTIONS
11 & 12**

ENGINEER SEAL
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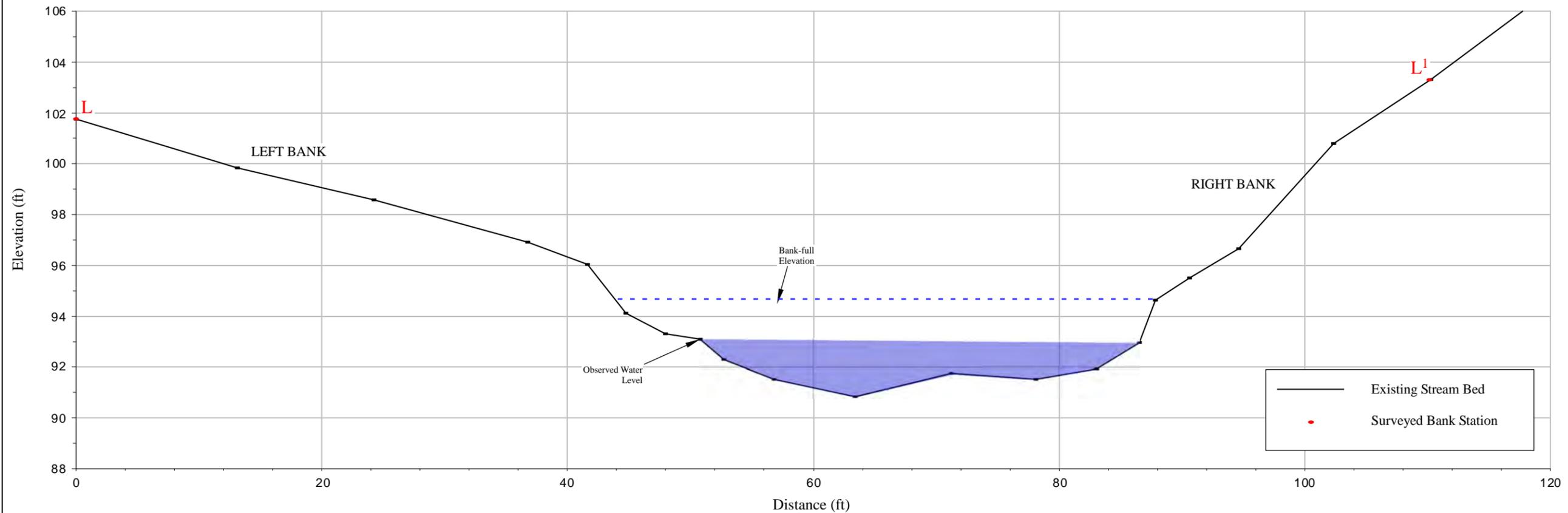
- NOTES**
1. Survey Data Obtained from Topographic Survey by TSRR; June 16-18, 2022.
 2. Survey References North American Vertical Datum 1988 (NAVD88).
 3. Property Boundaries Approximate, not Survey Accurate.

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Cross-section 11 K-K¹ (36+61): Restoration Site 23



Cross-section 12 L-L¹ (41+80): Downstream Restoration Site 25



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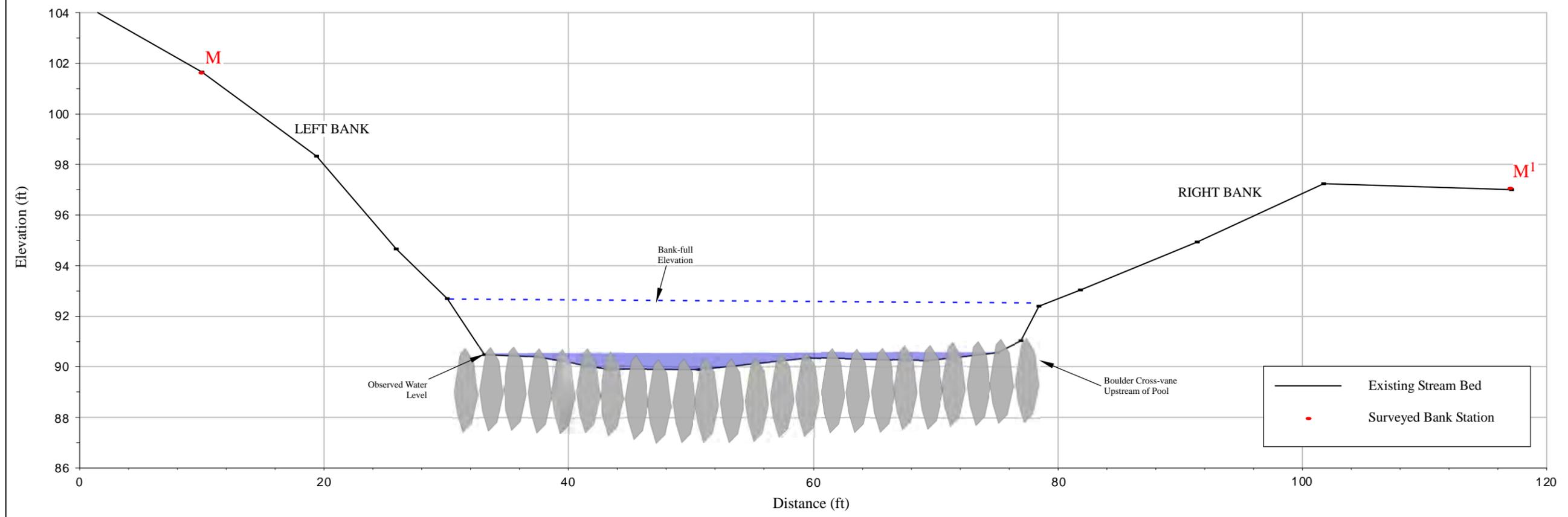
**MIANUS RIVER
RESTORATION
CROSS-SECTIONS
13 & 14**

ENGINEER SEAL
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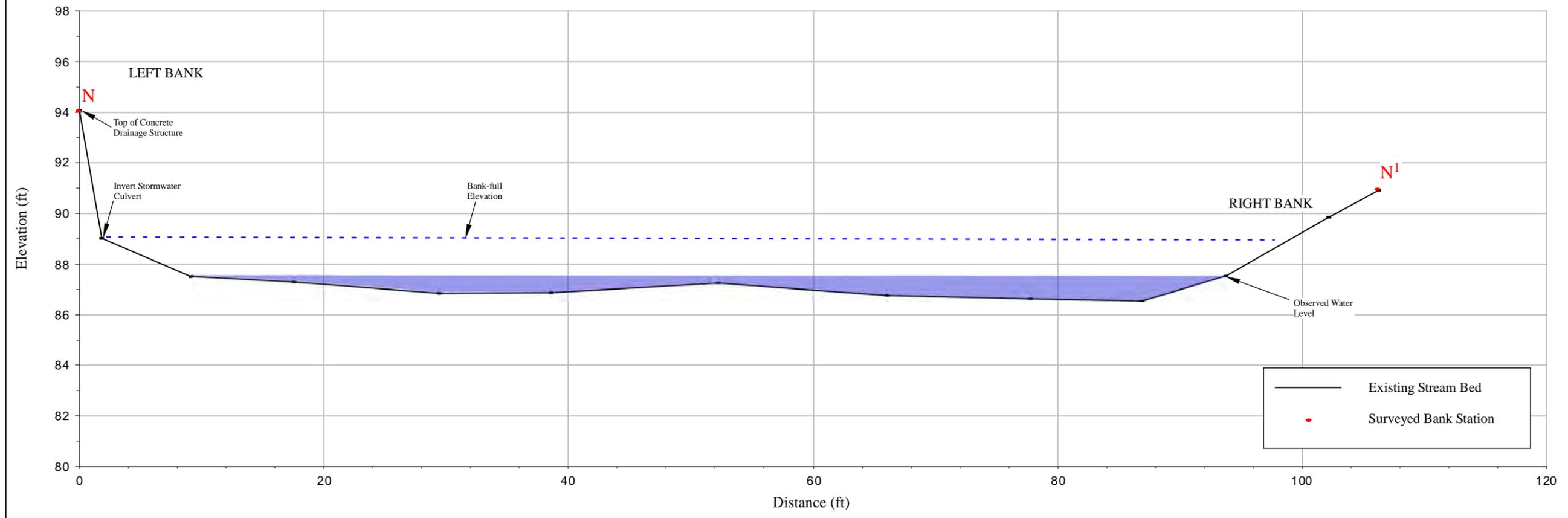
- NOTES**
- Survey Data Obtained from Topographic Survey by TSRR; June 16-18, 2022.
 - Survey References North American Vertical Datum 1988 (NAVD88).

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Cross-section 13 M-M¹ (44+11): Restoration Site 26



Cross-section 14 L-L¹ (47+75)



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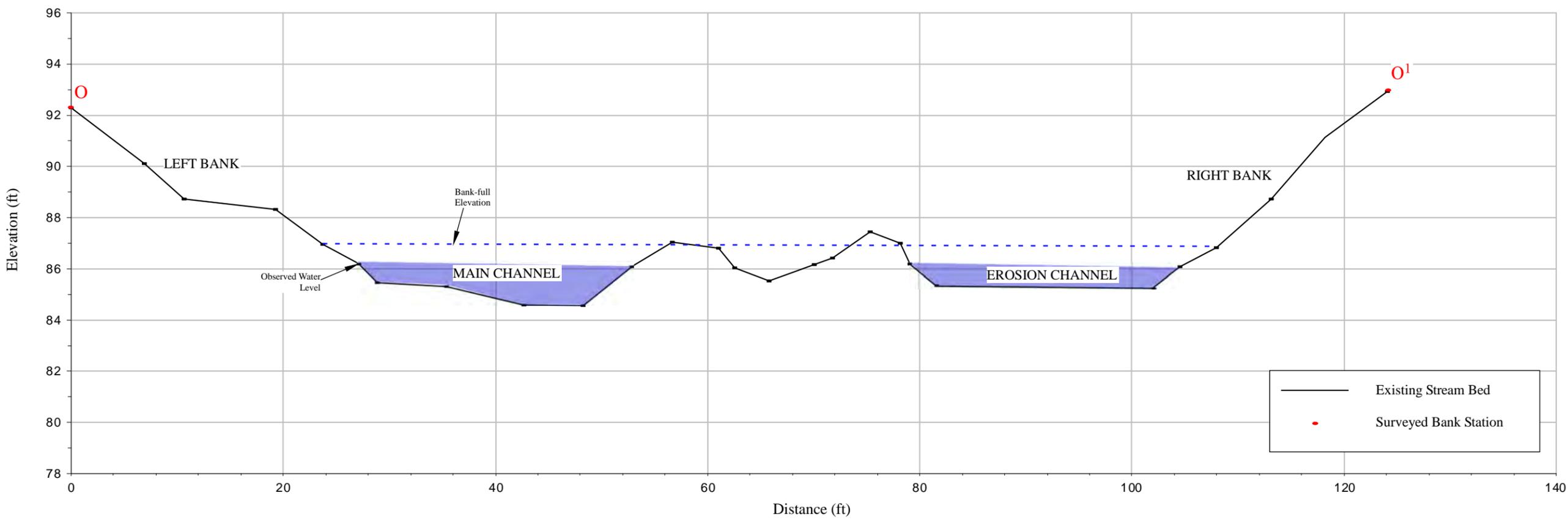
**MIANUS RIVER
RESTORATION
CROSS-SECTIONS
15 & 16**

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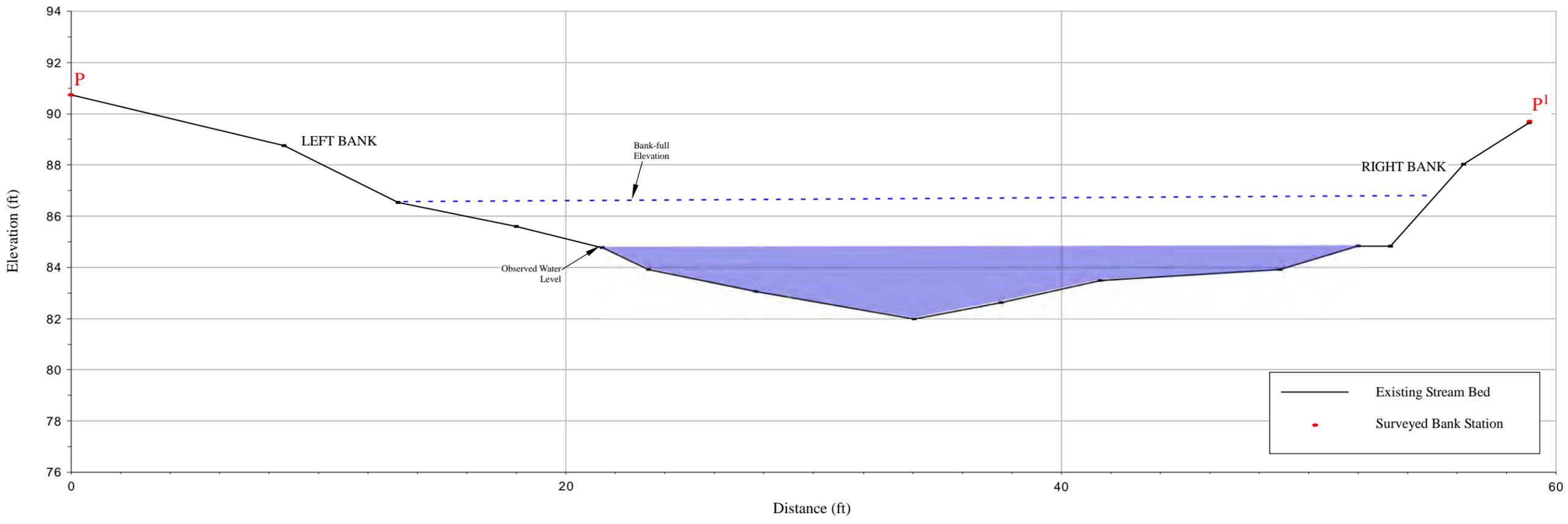
- NOTES**
- Survey Data Obtained from Topographic Survey by TSRR; June 16-18, 2022.
 - Survey References North American Vertical Datum 1988 (NAVD88).

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Cross-section 15 O-O¹ (50+44)



Cross-section 16 P-P¹ (51+97)



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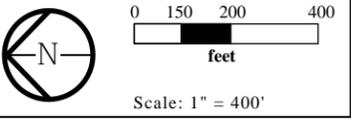
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**MIANUS RIVER
ACCESS AND
MATERIAL STAGING
MAP**

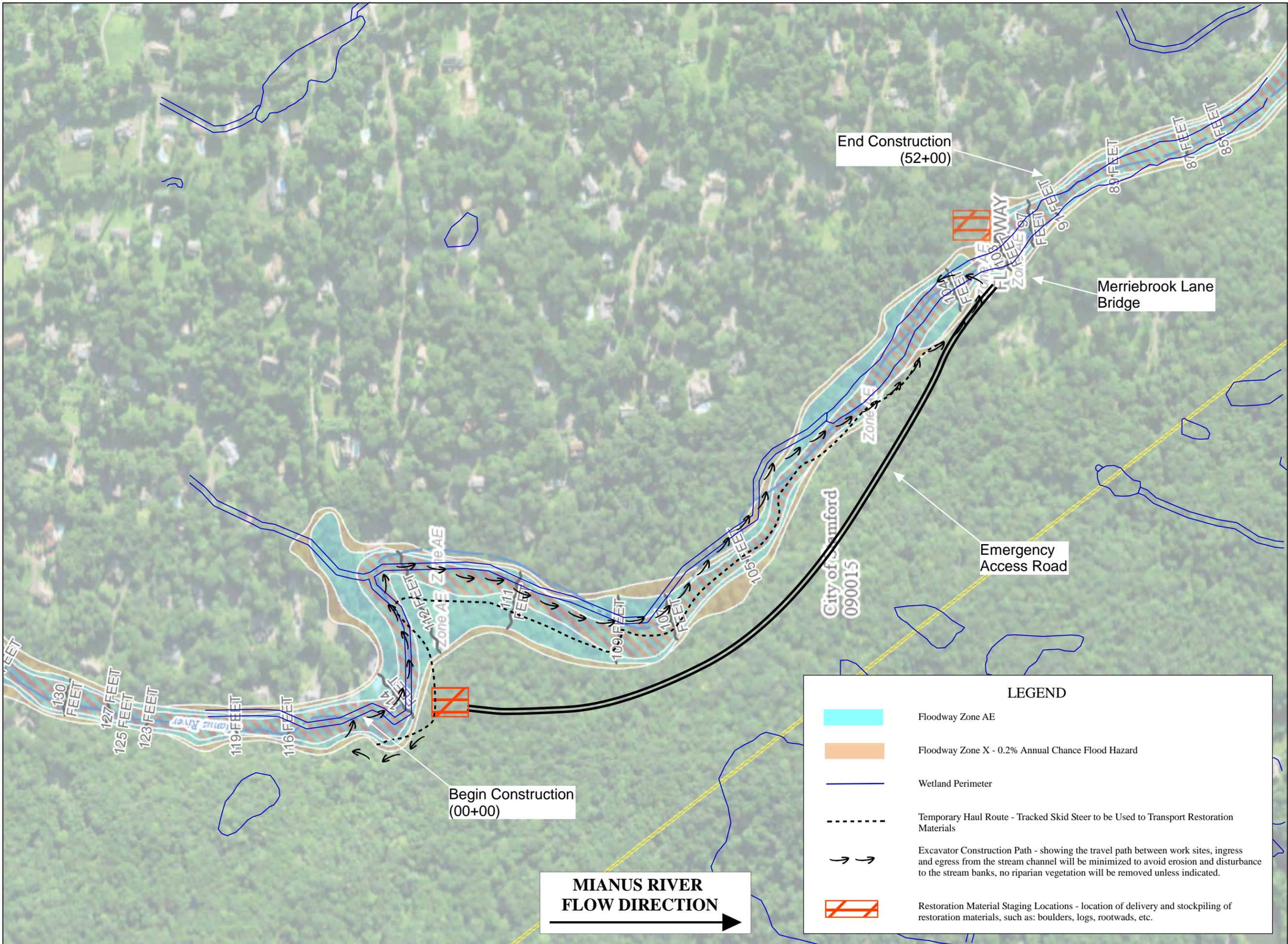
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2. Survey References North American Vertical Datum 1988 (NAVD88).



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LEGEND

-  Floodway Zone AE
-  Floodway Zone X - 0.2% Annual Chance Flood Hazard
-  Wetland Perimeter
-  Temporary Haul Route - Tracked Skid Steer to be Used to Transport Restoration Materials
-  Excavator Construction Path - showing the travel path between work sites, ingress and egress from the stream channel will be minimized to avoid erosion and disturbance to the stream banks, no riparian vegetation will be removed unless indicated.
-  Restoration Material Staging Locations - location of delivery and stockpiling of restoration materials, such as: boulders, logs, rootwads, etc.

**MIANUS RIVER
FLOW DIRECTION**



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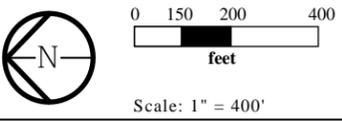
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MIANUS RIVER
EROSION &
SEDIMENT CONTROL
PLAN

ENGINEER SEAL
(WHEN APPLICABLE)

NOTES

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2. Survey References North American Vertical Datum 1988 (NAVD88).



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MIANUS RIVER
FLOW DIRECTION



LEGEND

-  Turbidity Barrier - anchored to each bank. Will be installed across the stream channel, at the downstream extent of the project prior to construction and removed immediately after.
-  Temporary Boulder Staging Locations - boulders will be staged during construction activity, also potential overnight excavator parking and fueling locations.
-  Stabilized Construction Staging Area & Access
-  Wetland Boundary



U.S. Fish and Wildlife Service
National Wetlands Inventory

Mianus River Park

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MIANUS RIVER PARK
NATIONAL
WETLANDS
INVENTORY MAP

ENGINEER SEAL
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- NOTES**
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 2. Survey References North American Vertical Datum 1988 (NAVD88).



February 3, 2023

Wetlands

- | | | |
|--------------------------------|-----------------------------------|----------|
| Estuarine and Marine Deepwater | Freshwater Emergent Wetland | Lake |
| Estuarine and Marine Wetland | Freshwater Forested/Shrub Wetland | Other |
| | Freshwater Pond | Riverine |

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
 This page was produced by the NWI mapper

Drawn By: EW Checked By: BC

Figure 8. Typical Rootwad Revetment
Plan View

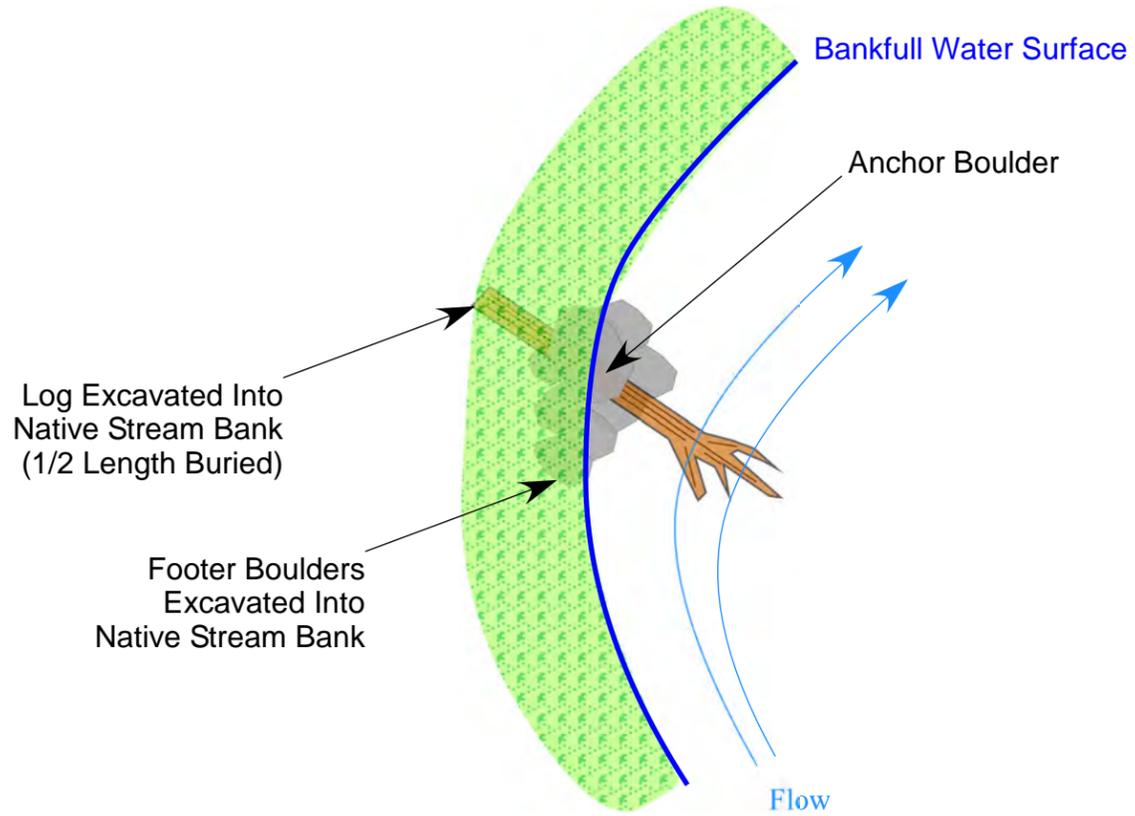
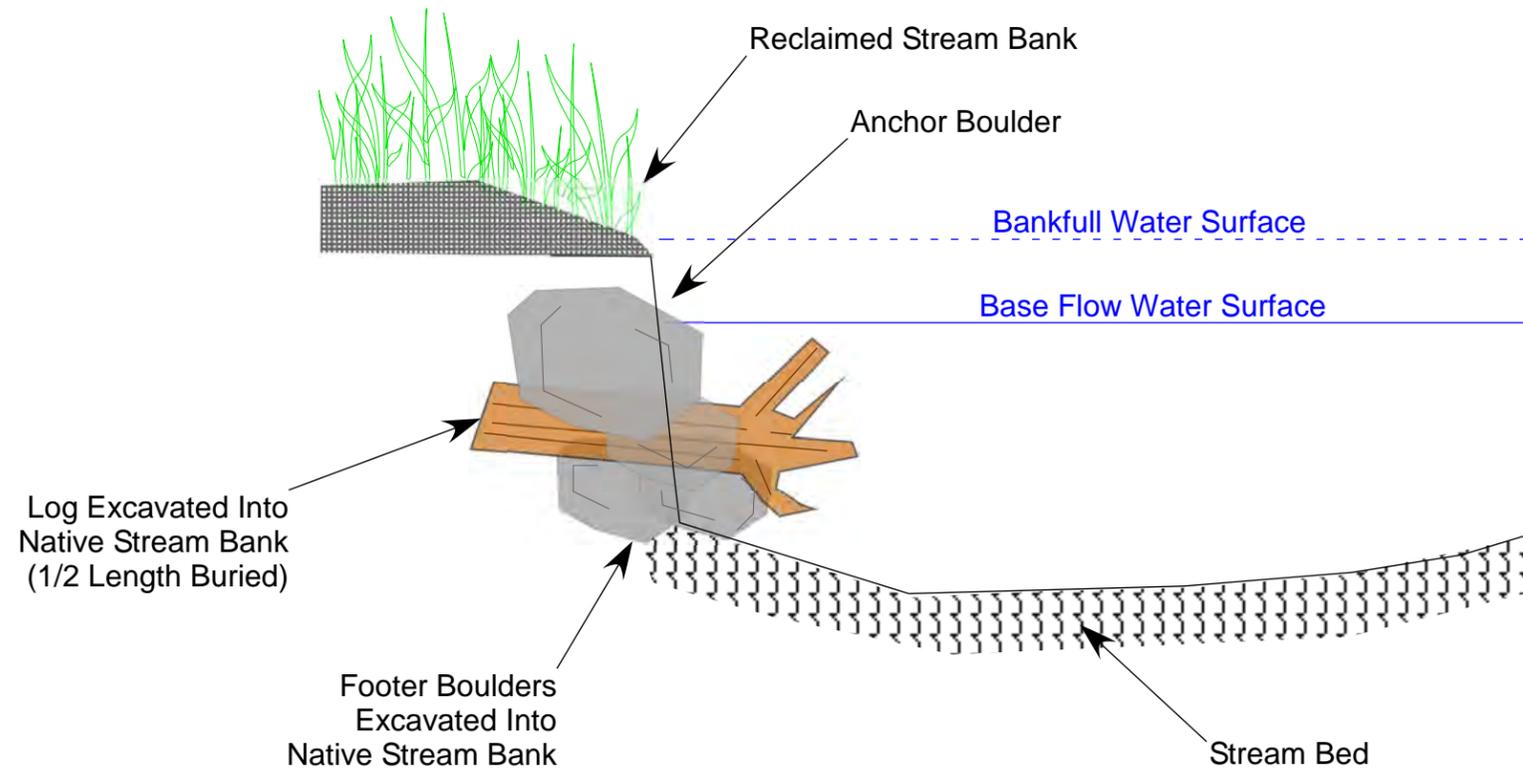


Figure 9. Typical Rootwad Revetment
Cross-section View



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**MIANUS RIVER
RESTORATION
PROJECT DESIGN**

**Stamford
Fairfield County, Connecticut**

**ROOTWAD
REVETMENT DESIGN
FIGURES**

ENGINEER SEAL
(WHEN APPLICABLE)

NOTES

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Figure 10. Typical Pool Excavation Plan View

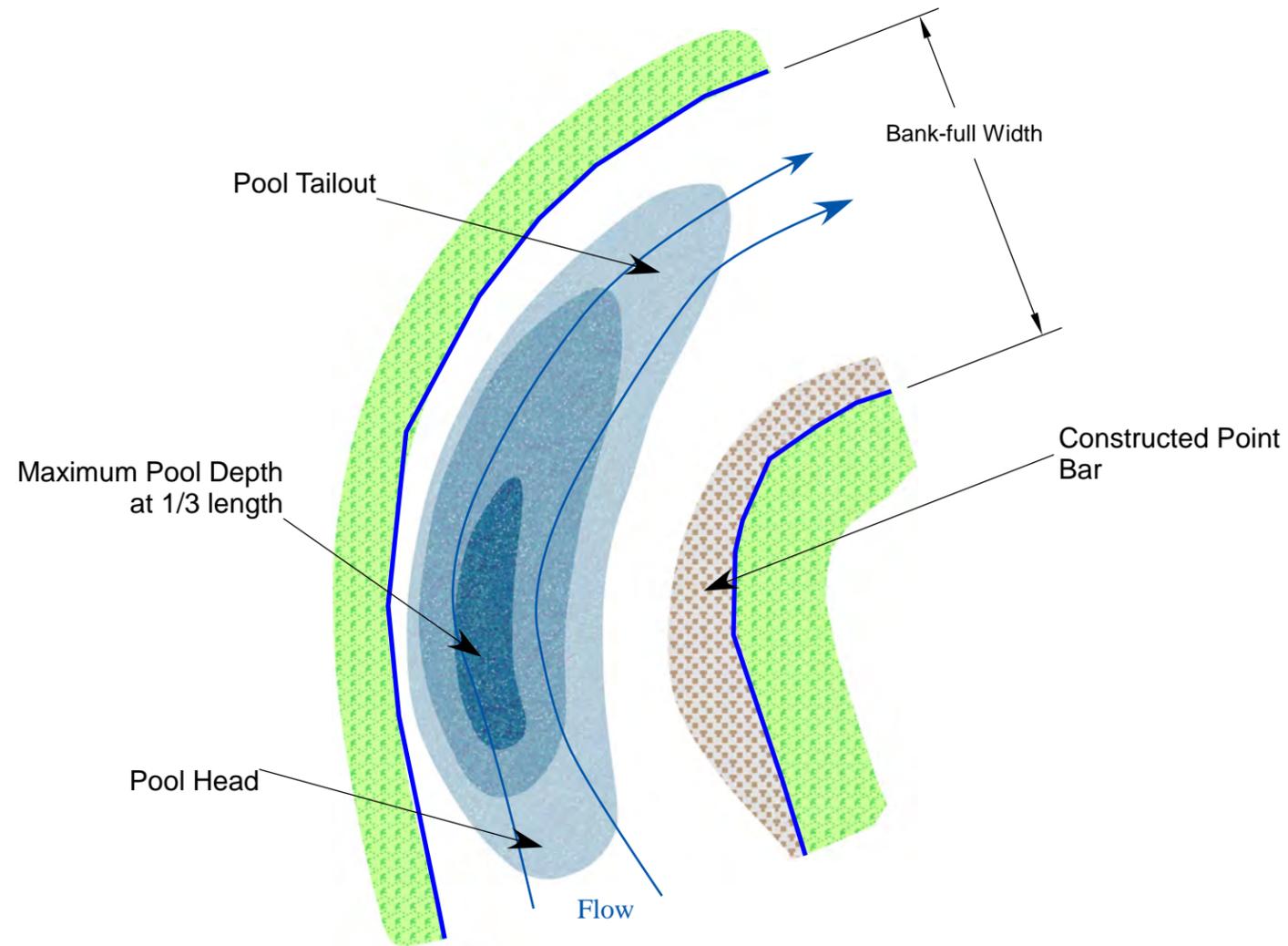
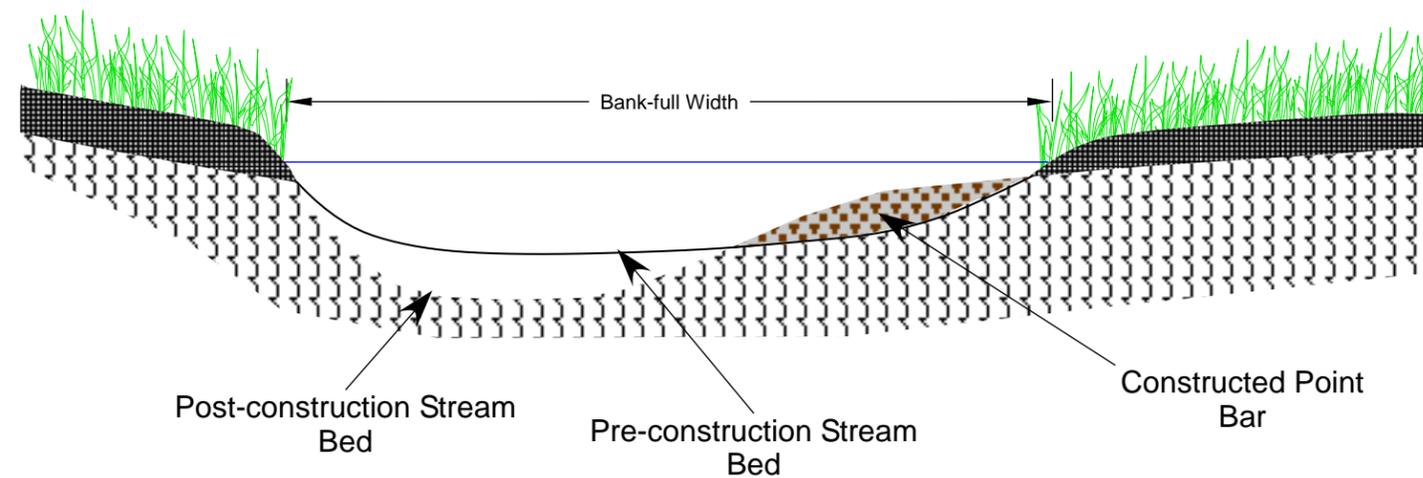


Figure 11. Typical Pool Excavation Cross-section View



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**MIANUS RIVER
RESTORATION
PROJECT DESIGN**

**Stamford
Fairfield County, Connecticut**

**POOL EXCAVATION
DESIGN FIGURES**

ENGINEER SEAL
(WHEN APPLICABLE)

NOTES

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Figure 12. Typical Conifer Revetment Installation
Cross-section View

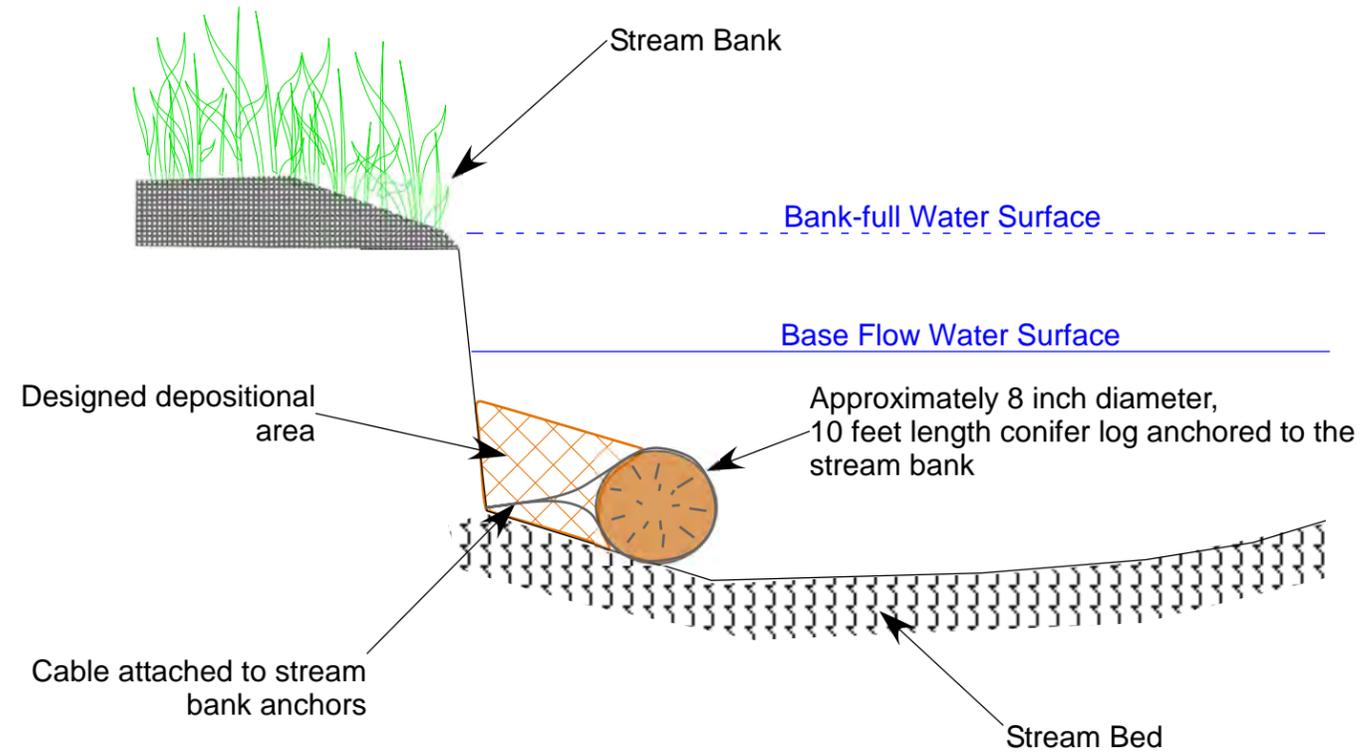
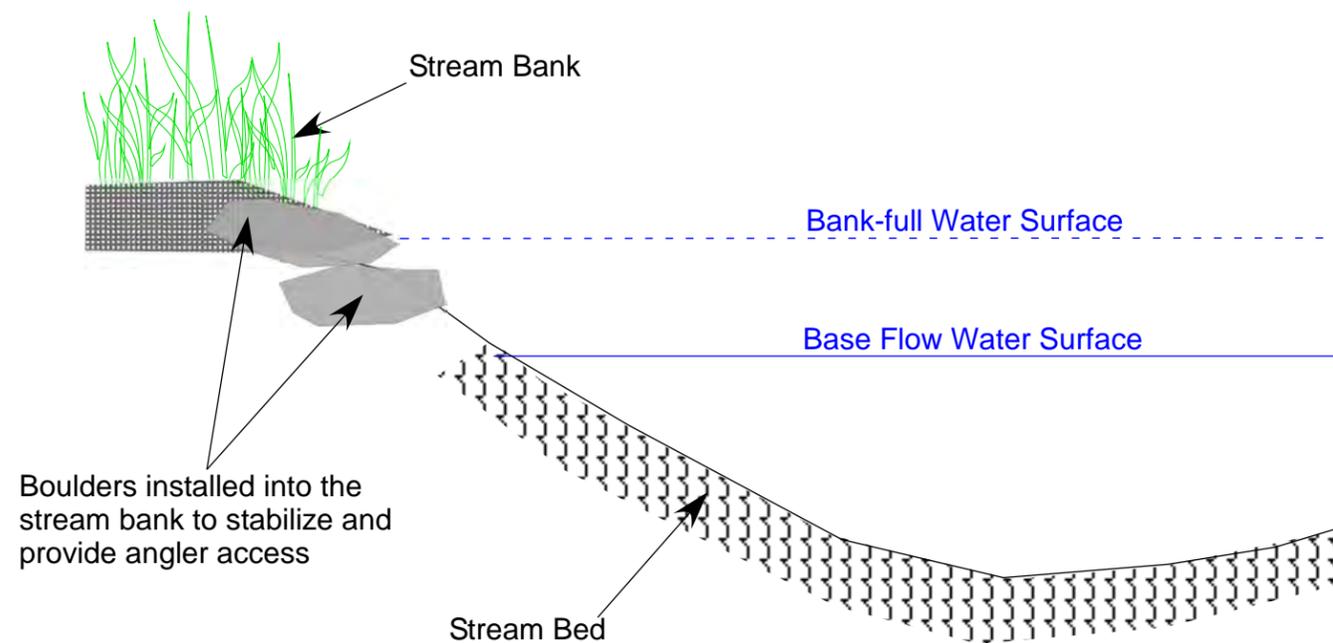


Figure 13. Typical Angler Access Boulder Placement
Cross-section View



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**STREAM BANK
REVETMENT
DESIGN FIGURES**

ENGINEER SEAL
(WHEN APPLICABLE)

NOTES

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Figure 14. Typical Cross-vane
Plan View

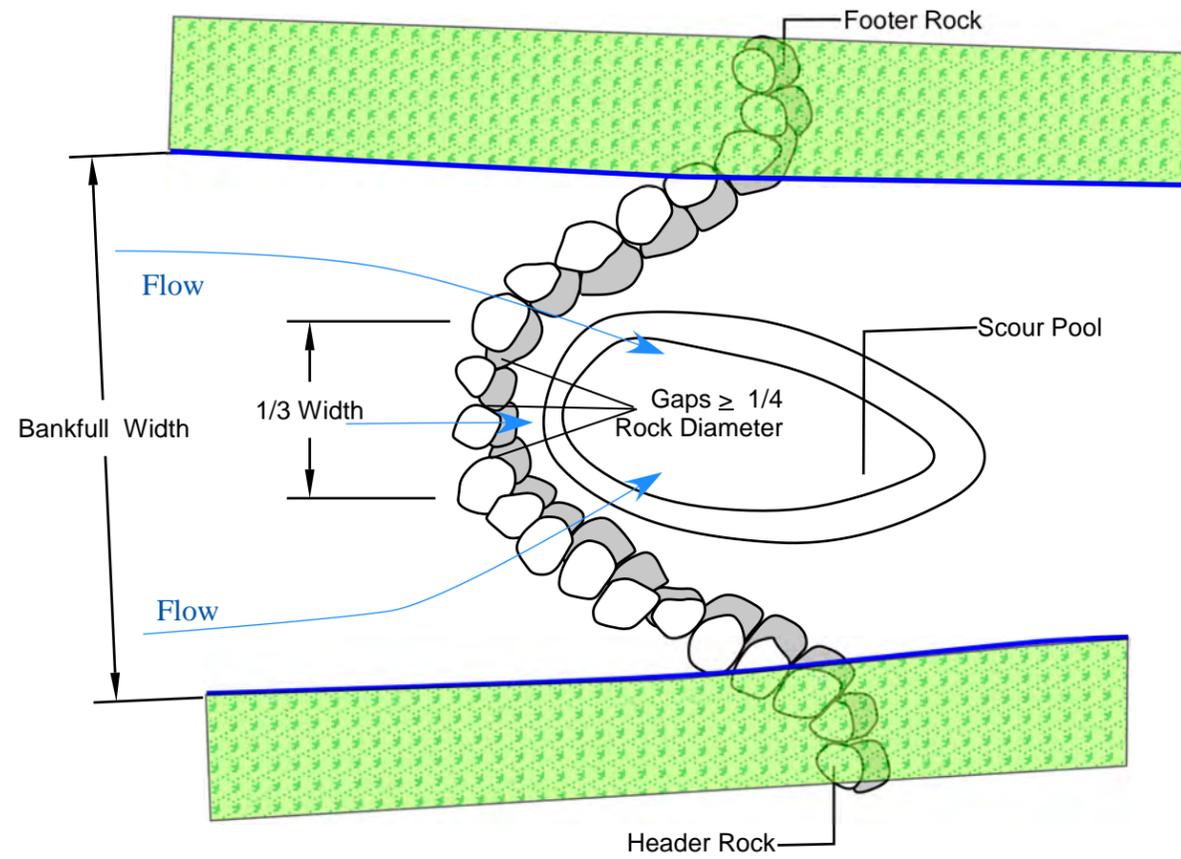
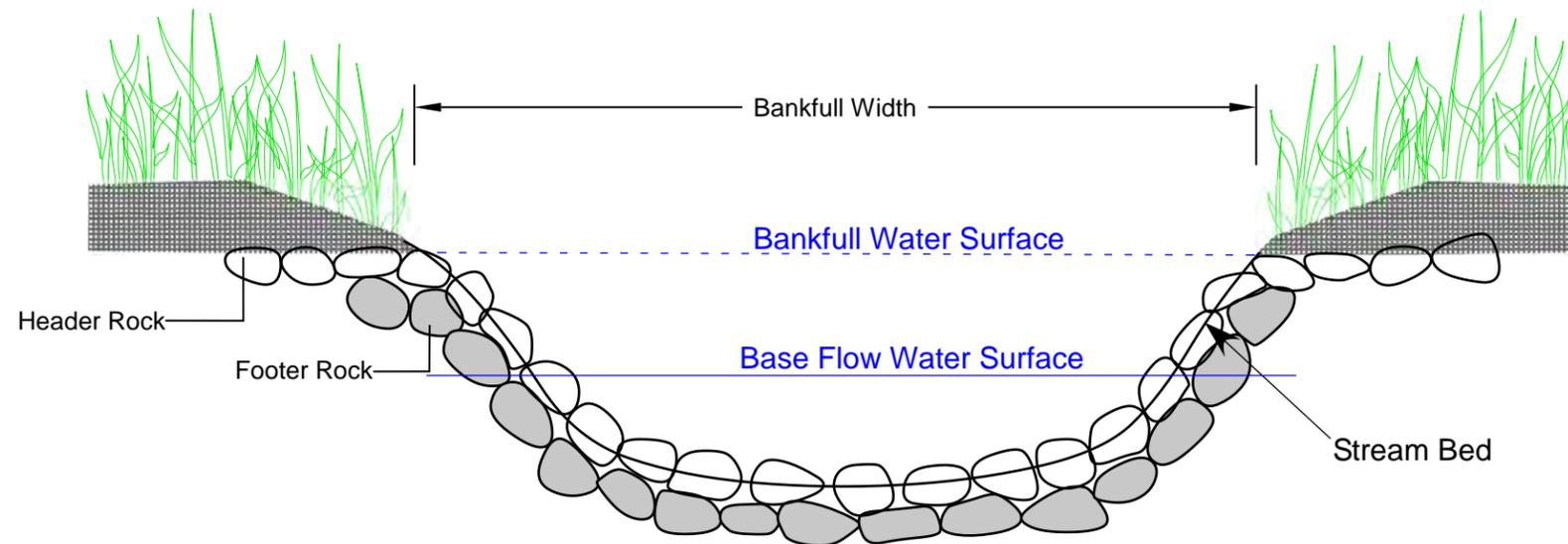


Figure 15. Typical Cross-vane
Cross-section View



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**MIANUS RIVER
RESTORATION
PROJECT DESIGN**

**Stamford
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**BOULDER
CROSS-VANE
DESIGN FIGURES**

ENGINEER SEAL
(WHEN APPLICABLE)

NOTES

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July 12, 2023 Mianus River Restoration Site Descriptions

Site 2 (fig.1, sh.5) (03+05-04+22): Install boulder cross-vane (figs.14&15, sh.27) to stabilize channel and concentrate flow through the proposed pool. Excavate pool 3 feet below current stream bed, excavated material will be relocated to construct left bank bar (fig.10&11, sh.25) and enhance upstream riffle. Install wood and boulder habitat (figs. 8&9, sh.24) into the excavated pool. Anchor logs with imported boulders and vertical logs buried into the stream bed. Imported boulders will be used to construct the cross-vane. See Table 1 for material quantities. Cross-section 2 (sh.13) transects the proposed pool's tail-out.

Site 5 (fig.1, sh.5) (07+85-08+90): Excavate pool 2 feet below current stream bed, excavated material will be relocated to enhance the upstream riffle.

Site 6 (fig.1, sh.5) (Tributary): Install three (3) boulder cross-vanes (figs.14&15, sh.27) in the Mianus River Tributary to prevent further stream channel degradation and promote sediment transport. Re-slope and reclaim 60 linear feet of the actively eroding right bank, replacing the woody debris revetment. Disturbed stream bank will be stabilized with erosion control matting and seeded with a native seed mix. Cross-section 4 (sh.14) transects the proposed stream bank stabilization location. Imported boulders will be used to construct the cross-vanes, see Table 1 for material quantities.

Site 7 (fig.1, sh.5) (09+50-10+37): Install boulder cross-vane (figs.14&15, sh.27) to stabilize channel and concentrate flow through the proposed pool. Install boulder deflector into the left bank to further provide relief to the eroding left bank. Downstream of the deflector fill scallop with excavated stream bed material and install wood and boulder habitat (figs. 8&9, sh.24). Anchor logs with imported boulders and vertical logs buried into the stream bed. Excavate pool 3 feet below current stream bed, excavated material will be relocated to construct right bank bar (fig.10&11, sh.25), fill left bank scallop, and enhance upstream riffle. Imported boulders will be used to construct the cross-vane. See Table 1 for material quantities. Cross-section 5 (sh.13) transects the proposed pool and wood/boulder habitat location.

Site 8 (fig.1, sh.5) (10+57-10+92): Install imported boulders into upstream riffle for habitat improvements and focus flow through the pool during low flow periods. Deepen existing pool minimally, excavated material will be relocated to enhance the upstream riffle. Imported boulders will be used for riffle enhancements, see Table 1 for material quantities.

Site 10 (fig.2, sh.6) (12+98-13+92): Install boulders into the upstream riffle to stabilize channel and concentrate flow through the proposed pool. Excavate pool 3 feet below current stream bed, excavated material will be relocated to enhance upstream riffle and create right bank point bar. Imported boulders will be used to enhance the riffle, see Table 1 for material quantities. Cross-section 6 (sh.13) transects the proposed pool.

Site 12 (fig.2, sh.6) (18+37-19+04): Install imported boulders into upstream riffle for habitat improvements and focus flow through the proposed run during low flow periods. Excavate run 2 feet below current stream bed, excavated material will be relocated to enhance the upstream riffle. Imported boulders will be used for riffle enhancements, see Table 1 for material quantities.

Site 13 (fig.3, sh.7) (19+80-20+70): Excavate pool 2 feet below current stream bed, excavated material will be relocated to enhance the upstream riffle and construct left bank bar.

Site 14 (fig.3, sh.7) (22+95-24+10): Install boulder cross-vane (figs.14&15, sh.27) to stabilize channel and concentrate flow through the proposed pool. Excavate pool 2 feet below current stream bed, excavated material will be relocated to construct left bank bar (fig.10&11, sh.25) and enhance upstream riffle. Install wood and boulder habitat (figs. 8&9, sh.24) into the excavated pool. Anchor logs with imported boulders. Imported boulders will be used to construct the cross-vane. See Table 1 for material quantities. Cross-section 8 (sh.16) transects the proposed pool.

Site 16 (fig.3, sh.7) (26+19-26+95): Install boulder/ log deflector at base of riffle, into the right bank to concentrate flow through the proposed pool. Deepen pool 2 feet below current stream bed, excavated material will be relocated to construct right bank bar (fig.10&11, sh.25) and enhance upstream riffle. Install wood and boulder habitat (figs. 8&9, sh.24) into the excavated pool. Anchor logs with imported boulders, see Table 1 for material quantities.

Site 17 (fig.4, sh.8) (27+15-29+72): Install imported boulders into the stream bed to improve habitat through site. See Table 1 for material quantities. Install alternating cedar revetments (fig.12, sh.26) into the right and left banks. Cross-section 9 (sh.17) transects the proposed habitat enhancements.

Site 18 (fig.4, sh.8) (30+15-30+87): Enhance riffle to concentrate flow through the proposed pool, improving sediment transport. Excavate pool 3 feet below current stream bed, excavated material will be relocated to construct left bank bar (fig.10&11, sh.25) and enhance upstream riffle.

Site 23 (fig.5, sh.9) (35+35-36+40): Install imported boulders into the stream bed to improve habitat through site. See Table 1 for material quantities. Cross-section 11 (sh.18) transects the proposed habitat enhancements.

Site 26 (fig.6, sh.10) (43+95-44+72): Install boulder cross-vane (figs.14&15, sh.27) to stabilize channel and concentrate flow through the proposed pool. Excavate pool 3 feet below current stream bed, excavated material will be relocated to enhance upstream riffle. Imported boulders will be used for boulder cross-vane, see Table 1 for material quantities.

Table 1. Mianus River Restoration Material Quantities

| SITE # | POOL EXCAVATION AREA (square feet) | EXCAVATED MATERIAL (cubic yards) | RIFFLE ENHANCEMENT AREA (square feet) | IN-CHANNEL FILL AREA (square feet) | IMPORTED BOULDER QUANTITIES (3-5' long axis, D50= 48") | WOODY HABITAT 18 inch Diameter Logs, 15 ft Long with Rootwad Attached |
|--------|------------------------------------|----------------------------------|---------------------------------------|------------------------------------|--|---|
| 1 | | | | | | |
| 2 | 1400 | 105 | 1620 | 520 | 30 | 5 |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | 800 | 30 | 1300 | 0 | 0 | 0 |
| 6 | 0 | 25 | 0 | 0 | 20 | 0 |
| 7 | 1150 | 65 | 170 | 280 | 30 | 3 |
| 8 | 680 | 15 | 350 | 0 | 10 | 0 |
| 9 | | | | | | |
| 10 | 1240 | 80 | 570 | 500 | 10 | 0 |
| 11 | | | | | | |
| 12 | 850 | 30 | 800 | 0 | 10 | 0 |
| 13 | 715 | 30 | 1000 | 380 | 0 | 0 |
| 14 | 920 | 35 | 900 | 400 | 20 | 0 |
| 15 | | | | | | |
| 16 | 970 | 60 | 1080 | 350 | 10 | 0 |
| 17 | 0 | 0 | 0 | 0 | 20 | 0 |
| 18 | 770 | 35 | 1300 | 170 | 0 | 0 |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | | | | |
| 22 | | | | | | |
| 23 | 0 | 0 | 0 | 0 | 15 | 0 |
| 24 | | | | | | |
| 25 | | | | | | |
| 26 | 850 | 60 | 1300 | 0 | 20 | 0 |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| TOTALS | 10,625 | 650 | 11,400 | 3,040 | 235 | 5 |



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MIANUS CHAPTER
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MIANUS RIVER RESTORATION PROJECT DESIGN

Stamford
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MIANUS RIVER RESTORATION SITE DESCRIPTIONS AND MATERIAL QUANTITIES

ENGINEER SEAL
(WHEN APPLICABLE)

NOTES

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