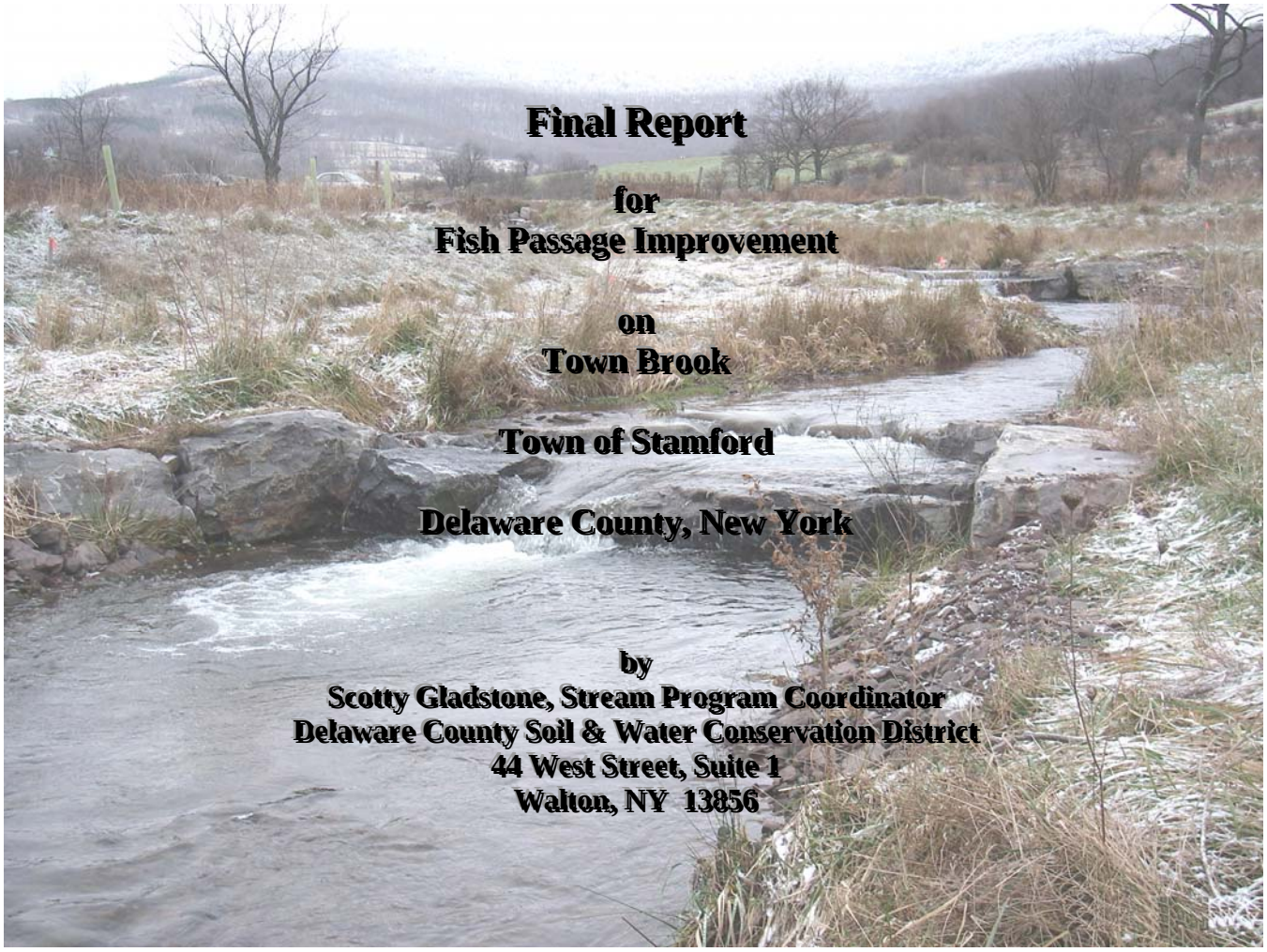


Final Report

for
Fish Passage Improvement

on
Town Brook

Town of Stamford

Delaware County, New York

by
Scotty Gladstone, Stream Program Coordinator
Delaware County Soil & Water Conservation District
44 West Street, Suite 1
Walton, NY 13856

Table of Contents

Project Site Description

Town Brook is located in the Town of Stamford, Delaware County, New York, and is within the New York City water supply watershed (see Maps 1-3 in Attachment B). The site is near the stream headwaters with a drainage area of 1.6 square miles. The stream here flows through two active dairy farm pastures. Both producers have buffered their respective stream reaches through the United States Department of Agriculture's Conservation Reserve Enhancement Program (CREP). (CREP pays for the installation of livestock exclusion fencing and plant materials to buffer streams flowing through agricultural lands. It also provides for annual per acre rental payments for 10-15 years).

The downstream location is readily accessible, is a public fishing stream and is currently used for education and outreach tours. The site will continue to be used for research and educational purposes. Data obtained from post-construction monitoring of both locations will be highlighted during future education and outreach events and will also be shared with those entities that will find it useful.

Project Background

In 2004 the Delaware County Soil & Water Conservation District (DCSWCD), under contract with the New York City Department of Environmental Protection (NYCDEP), constructed a full-scale demonstration stream restoration project on the downstream farm. The project consisted of stream re-alignment, establishment of adequate floodplain and installation of in-stream rock structures to maintain grade control and pool locations, and to reduce stream sheer stress on the banks.

Post-project evaluations led to some concerns with fish passage at some of the rock cross-vane structures (A rock cross-vane is a U-shaped structure that ties in at the top of both stream banks with its apex, or throat, at the approximate stream bed elevation in the stream center, upstream from the stream bank ties. The arms actually slope upstream in a downward direction toward the throat). The project design vertical drop from the throat rock to the water surface below the throat rock was within current regulatory standards. However, natural stream adjustments at four rock vanes resulted in vertical distances that exceeded the preferred threshold for migrating fish. The first solution was to cut notches in the throat rocks of the rock cross-vane structures. During 2005 DCSWCD, NYCDEP, the New York State Department of Environmental Conservation (NYSDEC), the U.S. Army Corps of Engineers (USACOE) and the U.S. Fish and Wildlife Service evaluated the project and decided more was needed. Various methodologies to mitigate the issue were subsequently discussed and evaluated.

This project reach begins at the outlet of a 95" x 67" corrugated metal pipe arch culvert under the Davis Road Town Highway, which is also the property boundary between the two farms owned by the David Post and John Palmatier families, respectively. High flow events in late 2004 and in 2005 created unraveling of the stream upstream of the culvert on the Palmatier property. There was a potential risk that the stream would re-channelize, compromising the town highway, the CREP buffers and pastureland on both

farms. This area was also contributing excessive sediment to the New York City water supply system.

Project Description

The goal of the involved parties is to improve fish passage at four rock cross-vane structures in the upper part of the project reach on the Post farm. It was agreed to retrofit the four cross-vane structures with a cross-bar structure. The cross-bars were placed at approximately one-half the length of the cross-vane and at approximately one-half the elevation between the stream bed at the cross-bar location and the elevation of the throat. This created two smaller pools with a shorter jump height for migrating fish. Rocks on the downstream most rock cross-vane in the original project reach that were dislodged by the June 27, 2006 flood were re-positioned.

To mitigate the upstream situation on the Palmatier farm the goal was to stabilize the stream bed and banks immediately upstream of the culvert. This was accomplished by slight re-alignment of the stream, armoring the stream bed and banks, and installing a rock cross-vane structure to prevent future head-cutting.

The project will be monitored for five years using the existing monitoring protocol developed during the original project implementation of the downstream location. Additional monitoring cross-sections were established to monitor project effectiveness.

Work Performed

Post farm: Site was de-watered by pumping around the work areas. Cross-bar structures were placed at the top three cross-vanes and at the double cross-vane as shown on sheet 2 - 4 of the project drawings entitled “David Post Stream Retrofit” and according to the attached specifications (Attachment D). Gravel backfill was placed behind the cross-bars to seal voids and create the second pool. The left arm downstream most cross-vane was repaired by re-setting the dislodged rocks.

Palmatier farm: Site was de-watered by pumping around the work area. A rock cross-vane structure with cross-bar was constructed on sheets 3 - 5 of the project drawings entitled “John Palmatier Streambank Stabilization” and to the attached specifications. The streambed was re-aligned and re-shaped as shown on sheets 2 and 3 of the project drawings and per the specifications. The streambed and streambanks were reinforced with stone fill and live stake vegetation installed as shown on sheets 3 - 5 of the drawings and according to the specifications (Attachment E).

Project Benefits

- The high quality of New York City's drinking water supplies will be ensured by minimizing sediment and pollutant delivery to the Cannonsville Reservoir by decreasing erosion and deposition.
- The improved and new structures will simultaneously optimize fish passage.
- Establishment of vegetation on streambanks will reinforce the soil with a good root system and provide shade for aquatic fauna.
- An opportunity to further advance the water quality and aquatic habitat benefits of geomorphically designed and constructed stream projects.

Conclusion

Streams are an ever changing part of nature. Erosion, deposition, meandering and flooding are all natural variables in a stream system. These variables rely on and affect each other and are in equilibrium in a stable system. When outside influences such as man's intervention upset one of these variables, one or more of the remaining variables will compensate or may even become exacerbated.

In the case with the lower project location, a project constructed in 2004 to demonstrate a full geomorphic stream restoration has functioned well hydraulically but some fish passage impediments were created. Although the rock cross-vane with cross-bar is currently an accepted practice it is not always necessary to construct the cross-bar component. However, since rock is sized large enough to withstand high flows situations like were created by using large rock in smaller streams can lead to fish passage impediments such as encountered at the David Post project location. As part of the learning experience, this information can be used when preparing future designs and in the education and outreach process.

At times streams adjust beyond some the boundaries we have created for them. In the case with the upper project location, the stream had migrated to a position so that it was no longer in good alignment with a large town highway culvert structure. In such situations it is necessary to assist the stream in order to prevent potential or further private and public property damage.

Geomorphic design and implementation principles and practices take advantage of the natural function of streams. By mitigating an unstable stream situation using these techniques and continuing to monitor there effectiveness, the chances of successful stream mitigation projects can be increased.

Attachment A

Budget

1/10/2011

Bid Tally Sheet - Post Retrofit/Palmatier Stream Stablization

Post

Bid Item No.		Units	Estimated Quantities	Estimate	T.C. Briggs			
1	Mobilization & Demobilization	LS		$5,040.00	$2,275.00			
2	Pollution Control	LS		$1,000.00	$2,500.00			
3	De-watering	LS		$19,000.00	$7,500.00			
4	Stream Channel Excavation & Grading	LS		$0.00				
5	Rock/Cross Vanes (Vane Bars)	LF	47	$10,200.00	$6,815.00			
7	Rock/Cross Vanes (Repair Vane @ Sta 11+60)	LS		$1,200.00	$2,000.00			
8	Seeding & Mulching	LS		$2,200.00	$3,300.00			
			Total Bid Price	$38,640.00	$24,390.00		$0.00	

Palmatier

Bid Item No.		Units	Estimated Quantities	Estimate	T.C. Briggs			
1	Mobilization & Demobilization	LS		$3,600.00	$3,500.00			
2	Pollution Control	LS		$2,959.00	$2,200.00			
3	De-watering	LS		$6,424.00	$4,000.00			
4	Geotextile	LS		$1,171.00	$800.00			
5	Erosion Control Material	LS		$1,092.00	$4,050.00			
6	Stream Channel Excavation & Grading	LS		$3,864.00	$9,000.00			
7	Rock/Cross Vanes	LF	50	$11,100.00	$7,250.00			
8	Rock Riprap	SF	1,600	$8,118.00	$12,800.00			
9	Live Stakes/Posts (Do week of Nov 13)	LS		$792.00	$1,500.00			
10	Seeding & Mulching	LS		$2,700.00	$3,500.00			
Mod #1	Expand scope of rock cross-vane	LS		$2,320.00	$2,320.00			
			Total Bid Price	$44,140.00	$50,920.00		$0.00	

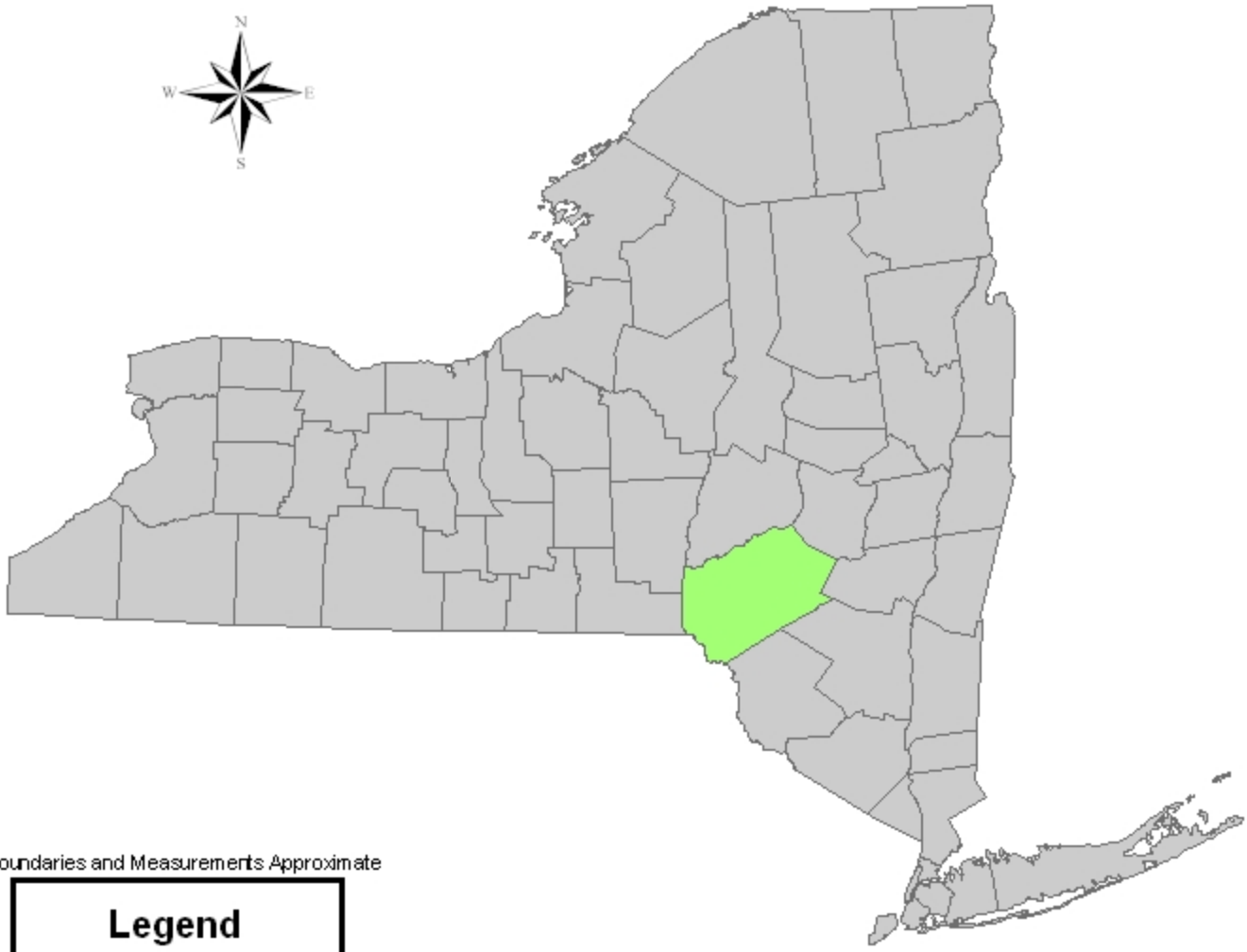
Totals	$82,780.00	$75,310.00
Less 10% Palmatier		$5,092.00
Less Incomplete Work		$1,500.00
Invoice 1 Total		$68,718.00

Attachment B

Maps

Delaware County SWCD
John Palmatier and Dave Post Projects

Map 1
County Location Map



Boundaries and Measurements Approximate

Legend

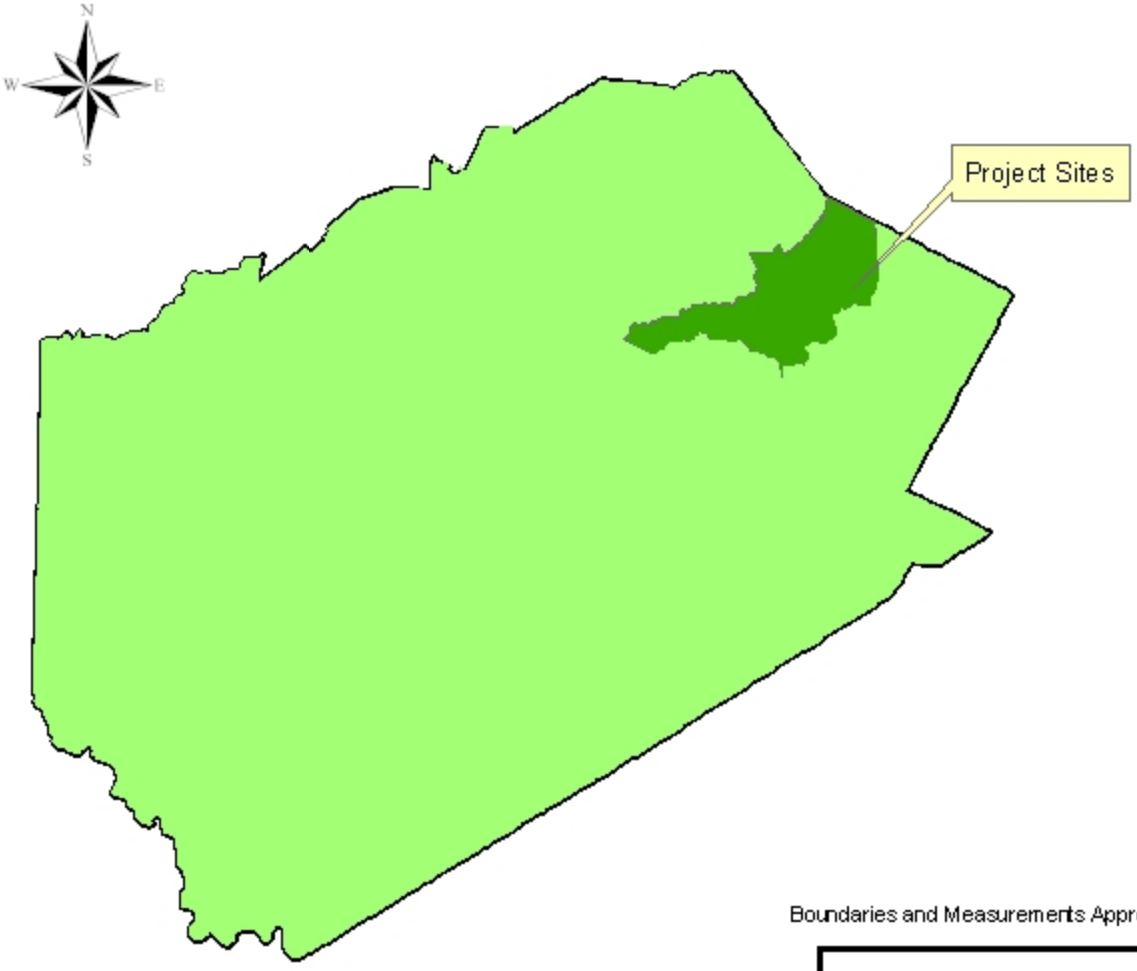
- New York State
- Delaware

60 30 0 60 120 180
Miles

Created by DCSWCD 1-17-07
D:\gisprojects\twb\demo\SDWA_Map1.mxd

Delaware County SWCD
John Palmatier and Dave Post Projects

Map 2
Town Location Map



Boundaries and Measurements Approximate

Legend

- Delaware County
- Town of Stamford

10 5 0 10 20 30 Miles

Created by DCSWCD 1-17-07
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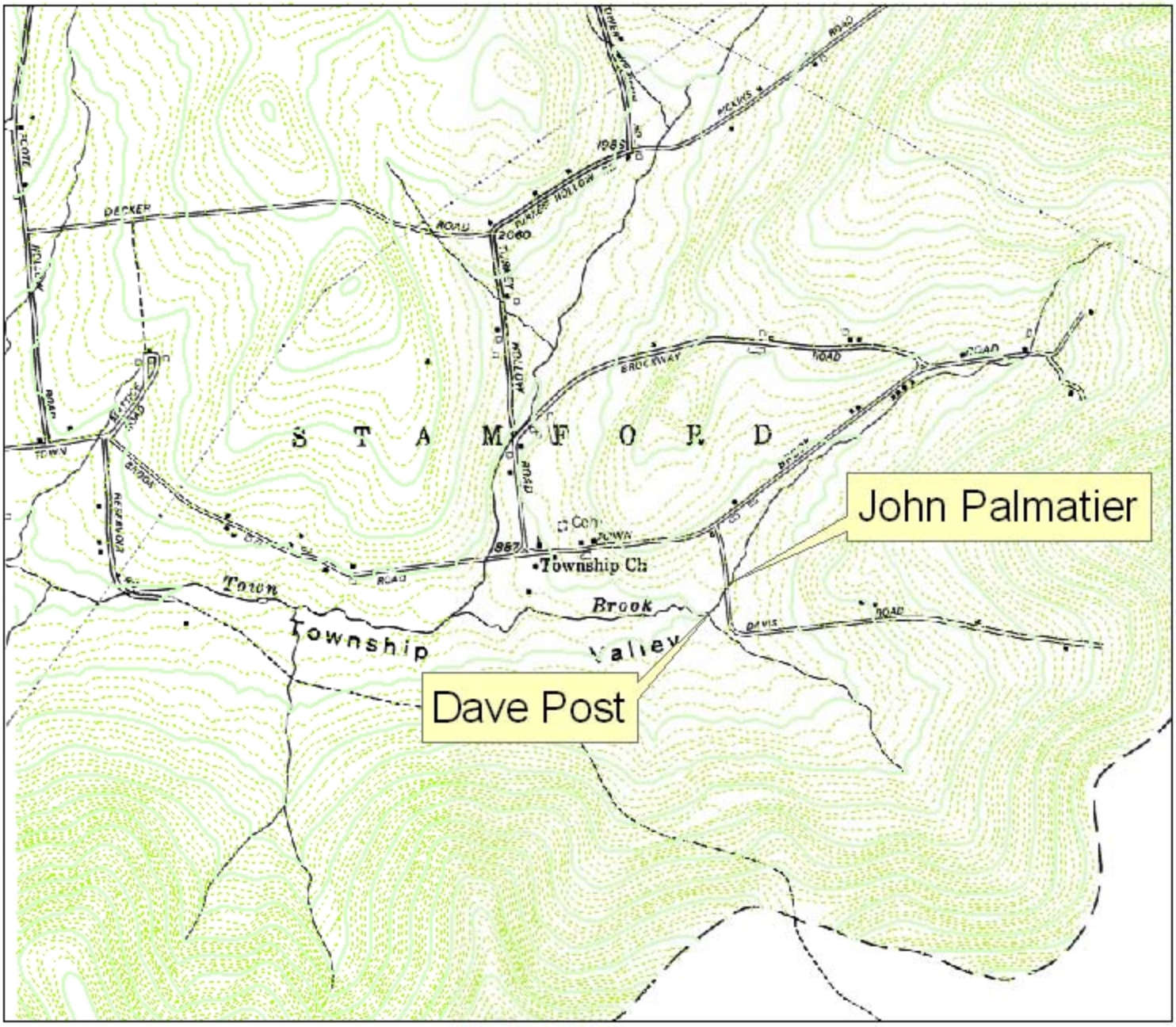
Delaware County SWCD
John Palmatier and Dave Post Projects

Map 3
John Palmatier and Dave Post Location Map



Scale
1:24000
1"=2000'

1,600 800 0 1,600 3,200 4,800
Feet

Created by DCSWCD 1-17-07

D:\gisprojects\twb\demo\SDWA_Map3.mxd

Attachment C

Photographs

Post Retrofit Project Before and After Photos

Photo 1: Looking upstream at Cross Vane 1 before retrofit.

Photo 2: Looking upstream at Cross Vane 1 after retrofit.

Post Retrofit Project Before and After Photos

Photo 3: Looking upstream at Cross Vane 2 before retrofit.

Photo 4: Looking upstream at Cross Vane 2 after retrofit.

Photo 5: Looking upstream at Cross Vane 3 before retrofit.

Photo 6: Looking upstream at Cross Vane 3 after retrofit.

Post Retrofit Project Before and After Photos

Photo 7: Looking upstream at double Cross Vane before retrofit.

Photo 8: Looking upstream at double Cross Vane after retrofit.

Post Retrofit Project Before and After Photos

Photo 9: Looking upstream at the end of project area before construction.

Photo 10: Looking upstream at the end of the project area after construction.

Palmatier Before and After Photos

Photo 1: Looking downstream from upper portion of project site before construction.

Photo 2: Looking downstream from upper portion of project site after construction.

Palmatier Before and After Photos

Photo 3: Looking upstream standing on Davis Road at culvert inlet before construction.

Photo 4: Looking upstream from Davis Road after construction.

Attachment D

As-built Project Drawings and Project Specifications - Post Farm

Stream Corridor Management Program

Delaware Co. SWCD

David Post Stream Retrofit

Dig Safely. New York
Underground Facilities Protective Organization
800-962-7962
www.**digsafelynewyork**.org
- ☐ **Call Before You Dig**
- ☐ **Wait The Required Time**
- ☐ **Confirm Utility Response**
- ☐ **Respect the Marks**
- ☐ **Dig With Care**

CONSTRUCTION NOTES

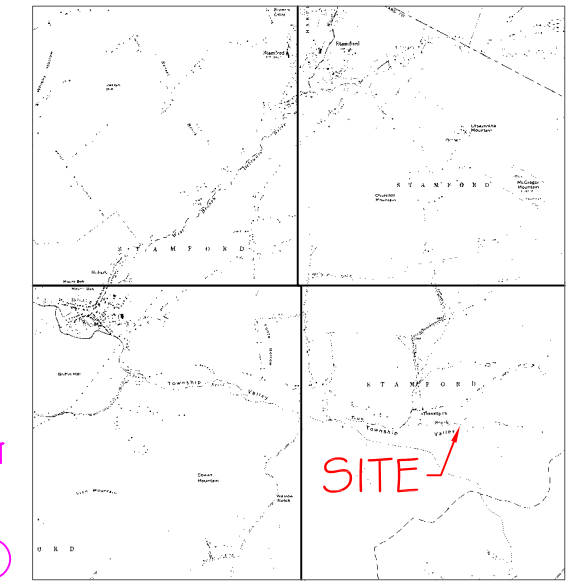
ALL WORK SHALL BE ACCOMPLISHED ACCORDING TO THE PLANS AND SPECIFICATIONS OF THE PROJECT. ANY CHANGES SHALL BE WITH PRIOR WRITTEN APPROVAL BY THE ENGINEER AND/OR CONTRACTING OFFICER.

AT LEAST TWO FULL WORKING DAYS PRIOR TO EXCAVATION, THE CONTRACTOR SHALL NOTIFY THE UNDERGROUND FACILITIES PROTECTION ORGANIZATION (U.F.P.O.) AT 1-800-962-7962 AND ANY OTHER LOCAL UTILITIES THAT MAY BE IN THE AREA.

THE CONTRACTOR SHALL GIVE THE DCSWCD AND THE LANDOWNER/OPERATOR A MINIMUM OF TWO FULL WORKING DAYS NOTICE PRIOR TO CONSTRUCTION.

ALL CONSTRUCTION PRACTICES SHALL BE IN ACCORDANCE WITH O.S.H.A. STANDARDS AND REGULATIONS PART 1910 AND 1926. ALL TRENCH EXCAVATIONS IN UNSTABLE SOILS OR IN TRENCHES GREATER THAN FIVE FEET DEEP SHALL BE SLOPED, SHORED, OR SHIELDED ACCORDING TO O.S.H.A. PART 1926.

CONTENTS



SITE MAP

I HAVE REVIEWED THE DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT. THE PROJECT HAS BEEN EXPLAINED TO ME FULLY, AND I AGREE WITH ALL TECHNICAL ASPECTS OF THE PROJECT.

LANDOWNER'S SIGNATURE:_____ DATE:_____

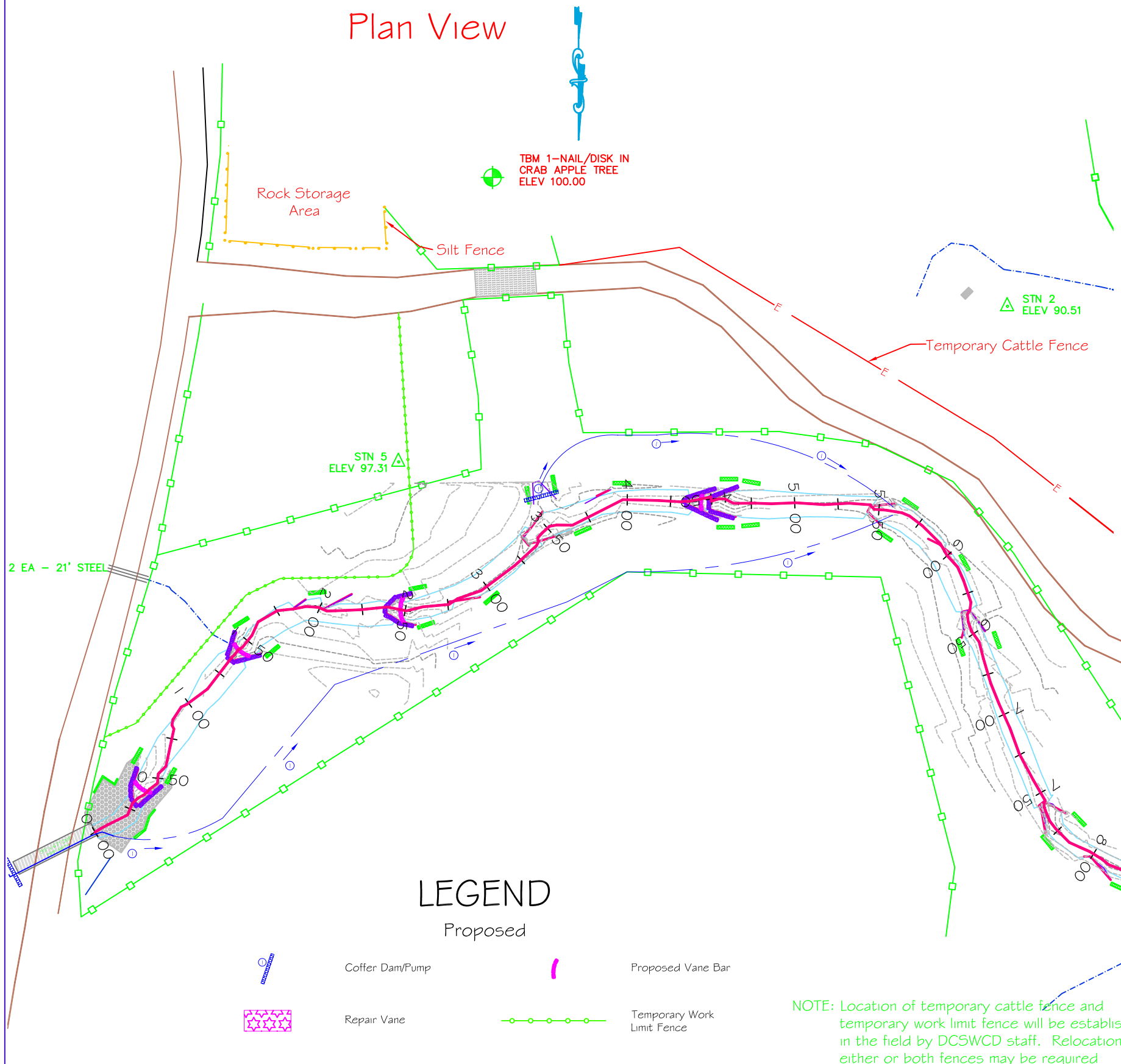
David Post Stream Retrofit

Title Sheet
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

Delaware County Soil & Water Conservation District
44 West Street
Walton, NY 13856

Designed G. Neale	Date 6-02-06	Approved by	
Drawn G. Neale	8-30-06	Title	
Traced		Title	
Checked S. Gladstone	9-06-06	Sheet No. of	Drawing No. DE-C-SCMP-001a

Plan View



SEQUENCE OF OPERATIONS

I. Mobilize

A. Construct silt fence around rock storage area.

B. Construct temporary cattle fence.

C. Construct temporary work limit fence.

II. Work between 0+00+/- and 4+75+/-

A. Construct cofferdam at Davis road culvert inlet and on tributary, install pumps, and pump to pool at 5+50+/-.

B. Construct vane bars at cross vanes at:

1. 0+25+/-
2. 1+30+/-
3. 2+50+/-
4. 4+50+/-

C. Remove cofferdams and dewatering installation.

D. Regrade floodplain damaged during construction, and seed and mulch.

III. Work between 11+50+/- and 12+00+/-.

A. Construct cofferdam and install pumps at pool at 10+75+/-. Pump to 12+00+/-.

B. Repair vane at 11+60+/-.

C. Reconstruct riffle to proper grade between 11+00+/- and 11+50+/-.

D. Remove cofferdam and dewatering installation. Repair any damage to pool at 10+75+/- caused by dewatering, if necessary.

E. Regrade floodplain damaged during construction and seed and mulch.

IV. Demobilize

A. Remove all pollution control devices.

LEGEND

Existing

- Edge Stream
- 2005 Existing Thalweg
- Existing Fence
- Farm Road
- Ditch
- Traverse Point
- TBM
- Cattle Crossing
- Dumped Rock
- Cattle Water Tank
- Vane Structure(2005)
- Existing Live Stake Planting

LEGEND

Proposed

- Coffer Dam/Pump
- Proposed Vane Bar
- Repair Vane
- Temporary Work Limit Fence

NOTE: Location of temporary cattle fence and temporary work limit fence will be established in the field by DCSWCD staff. Relocation of either or both fences may be required during construction.

Not To Scale

David Post Stream Retrofit

Plan View
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

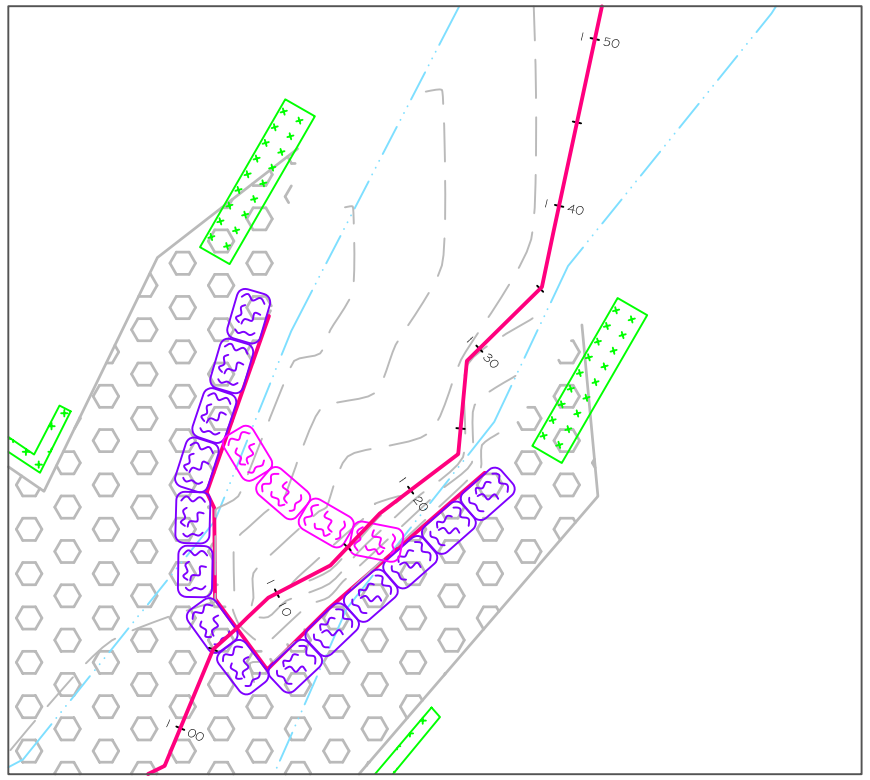
Delaware County Soil & Water Conservation District
44 West Street
Walton, NY 13856

Designed	G. Neale	6-12-06	Approved by
Drawn	G. Neale	8-30-06	Title
Traced			Title
Checked	S. Gladstone	9-06-06	Sheet No. 1 of 1

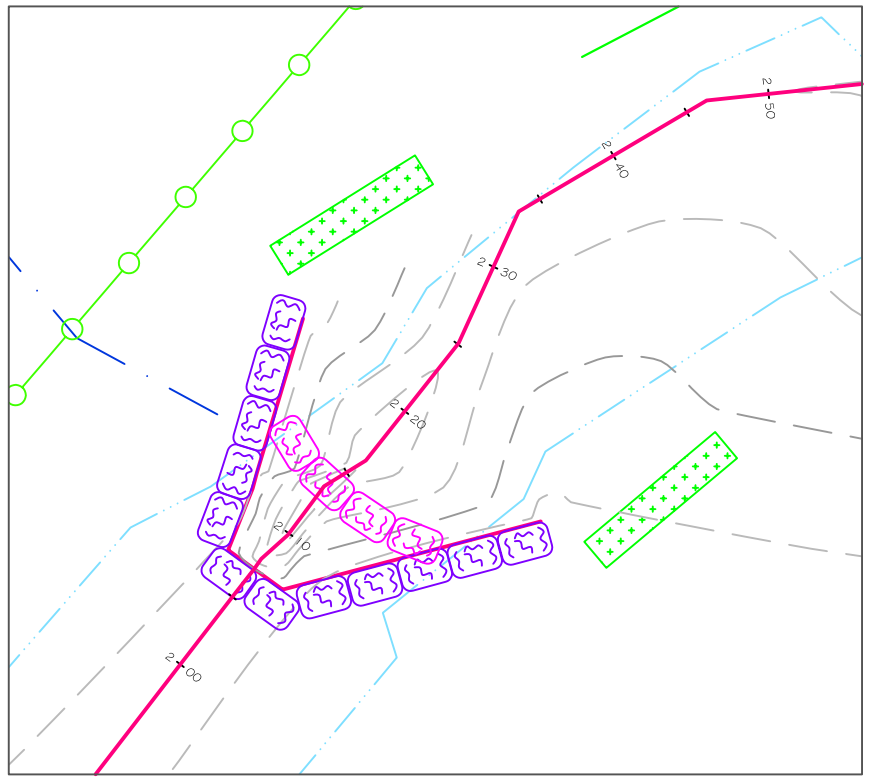
Drawing No. DE-C-SCMP-001a

Proposed Plan View

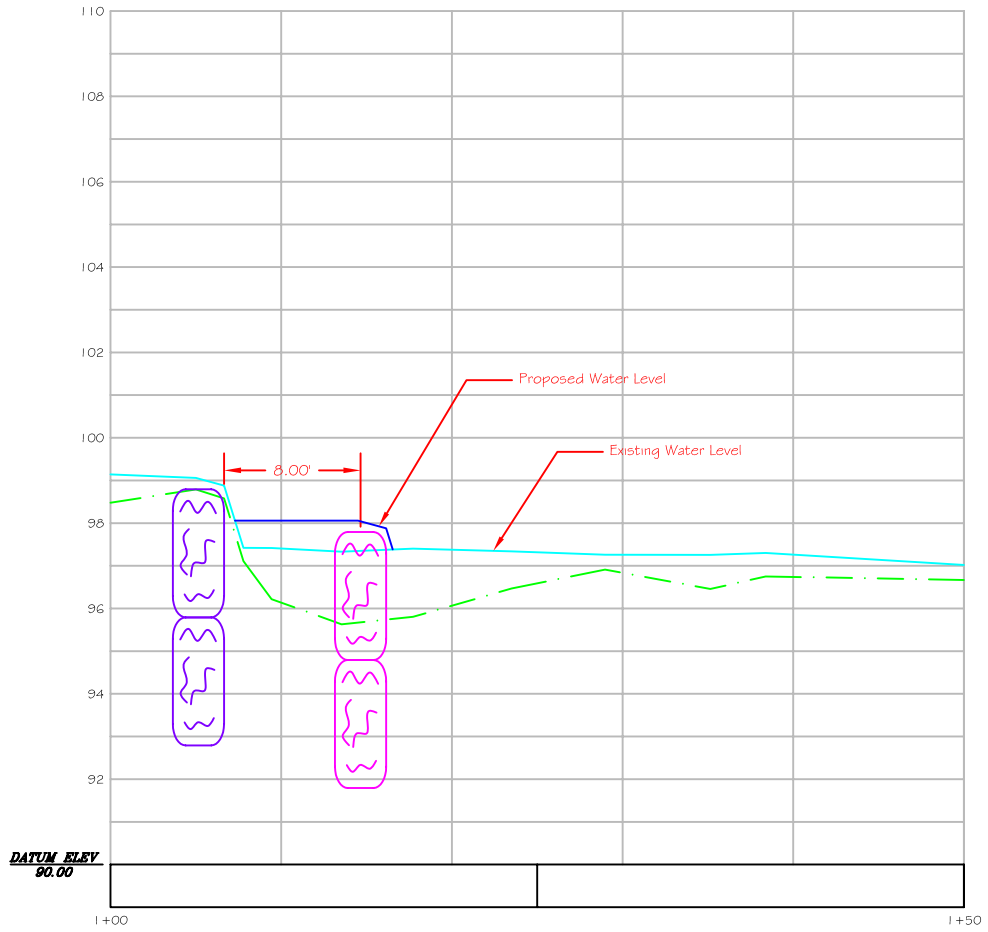
Vane @ 0+30

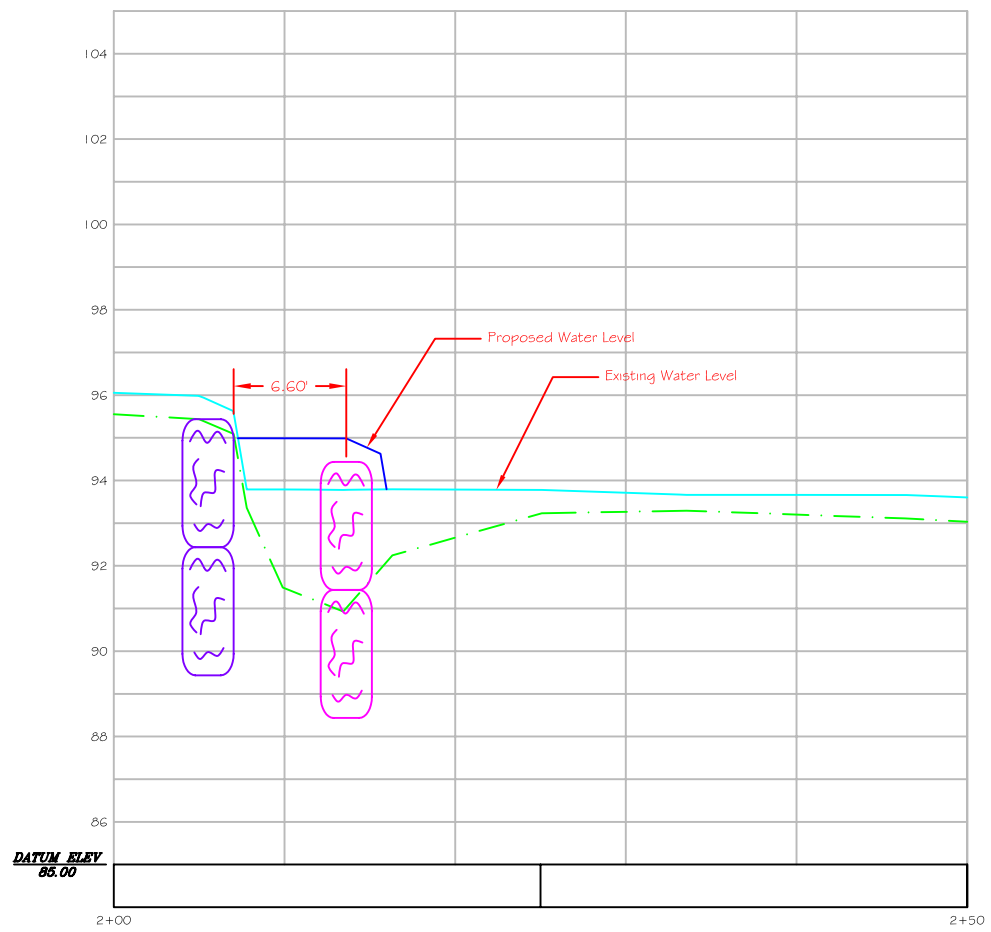


Vane @ 1+35



Proposed Profile





LEGEND

- Edge Stream
- 2005 Existing Thalweg (5+00)
- Existing Major Contour
- Existing Minor Contour
- Ditch
- Proposed Vane Structure
- Existing Vane Structure (2005)
- Existing Dumped Rock
- Existing Live Stake Planting
- Existing Willow Fascine

Not To Scale

David Post Stream Retrofit

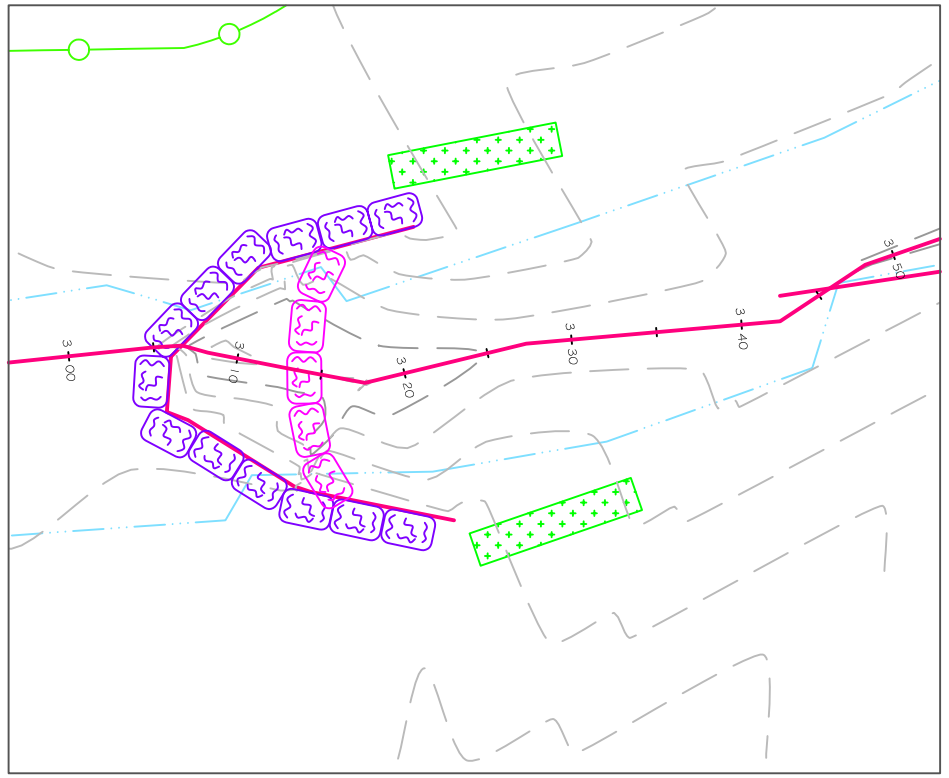
Vane Profile and Plan View
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

Delaware County Soil & Water Conservation District
44 West Street
Walton, NY 13856

Designed	G. Neale	6-12-06	Approved by
Drawn	G. Neale	8-30-06	Title
Traced			Title
Checked	S. Gladstone	9-06-06	Sheet No. 1 of 1

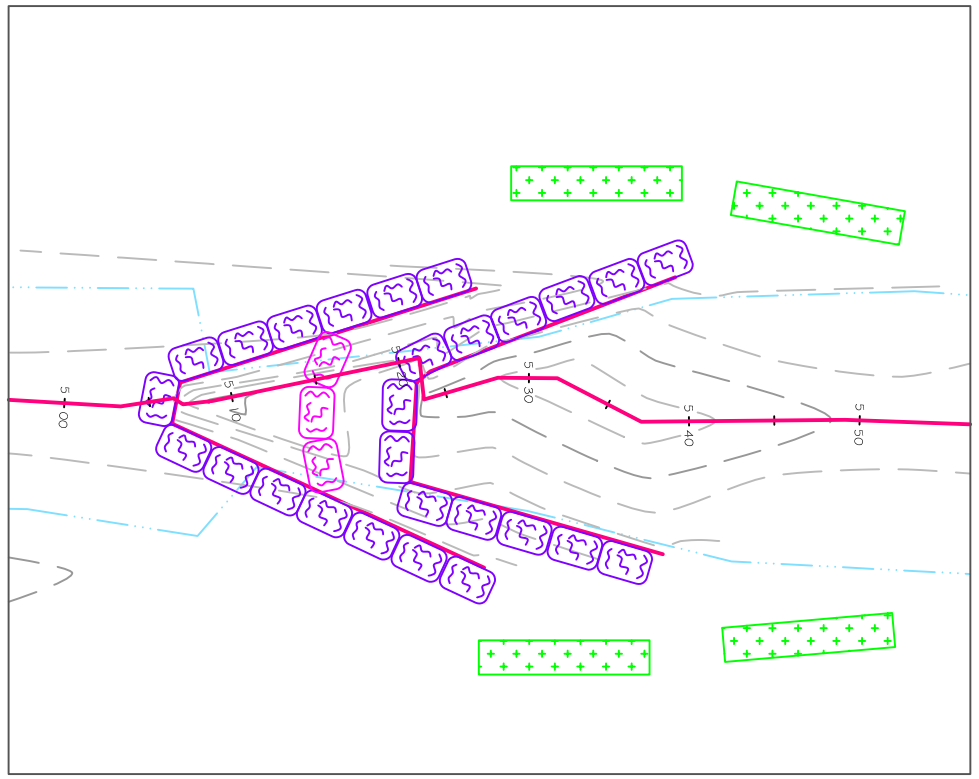
Drawing No.
DE-C-SCMP-001a

Vane @ 2+40



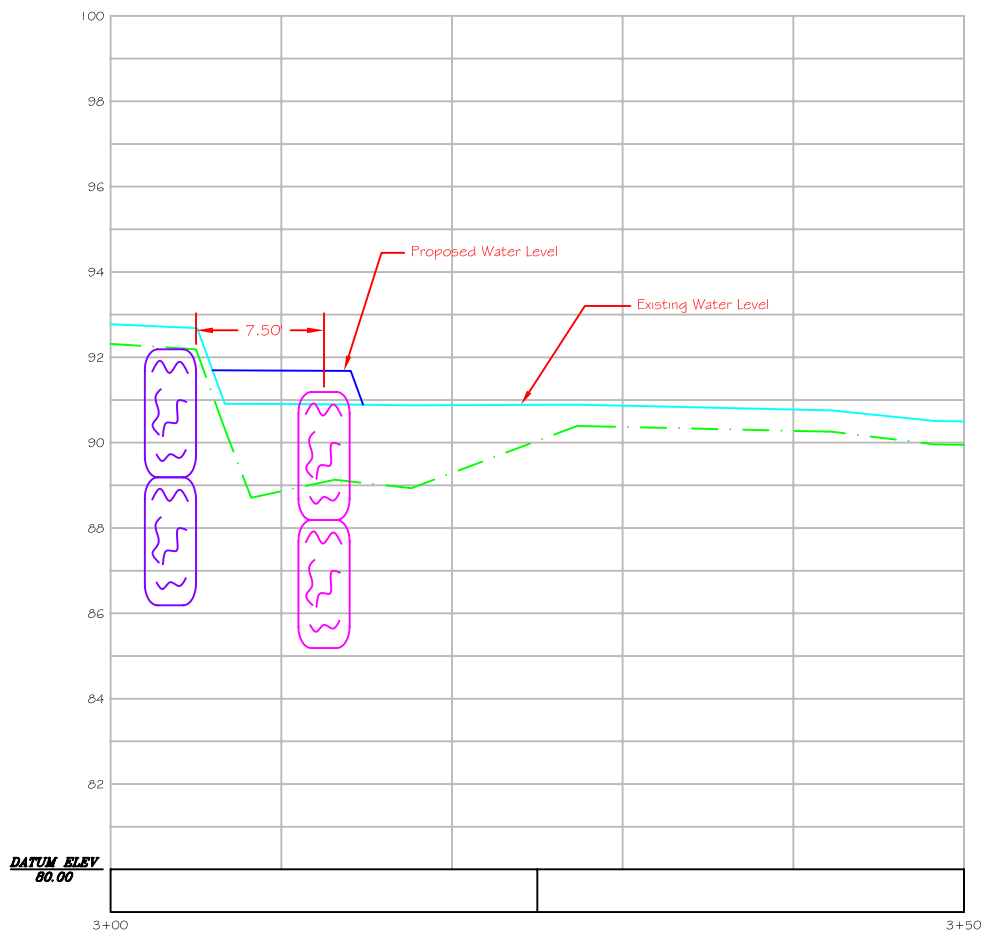
Proposed Plan View

Vanes @ 4+35 and 4+50

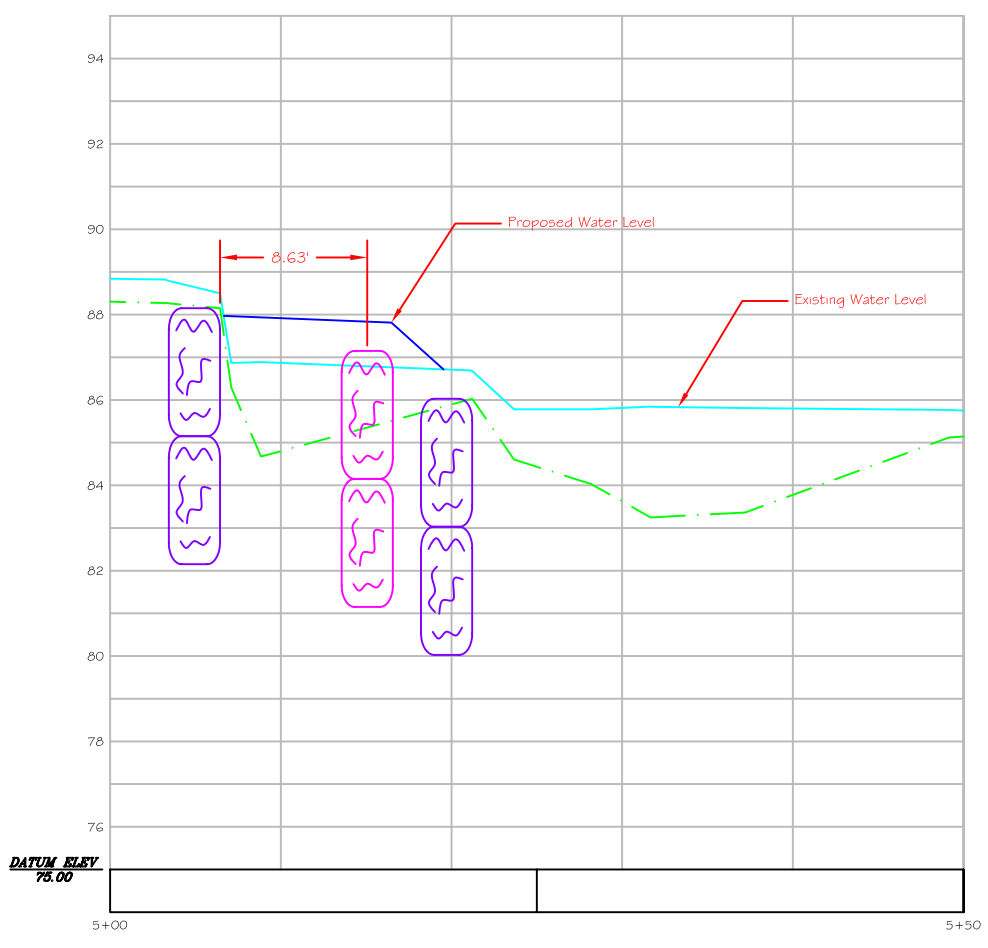


LEGEND

- Edge Stream
- 2005 Existing Thalweg (5+00)
- Existing Major Contour
- Existing Minor Contour
- Proposed Vane Structure
- Existing Vane Structure (2005)
- Existing Live Stake Planting



Proposed Profile



Not To Scale

David Post Stream Retrofit

Vane Profile and Plan View
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

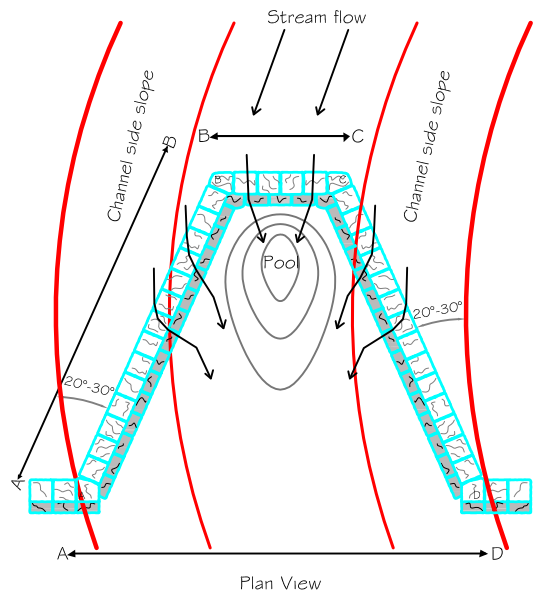
Delaware County Soil & Water Conservation District
44 West Street
Walton, NY 13856

	Date		
Designed	G. Neale	6-12-06	Approved by
Drawn	G. Neale	8-30-06	Title
Traced			Title
Checked	S. Gladstone	9-06-06	Sheet No. 4 of 5

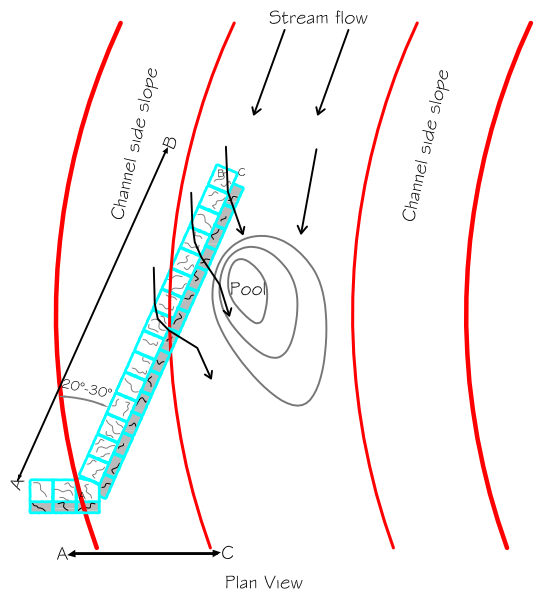
Drawing No. DE-C-SCMP-001a

Vane Details

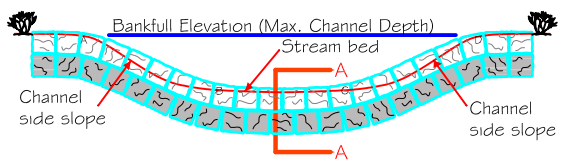
Use Schematically for Vane Bar Construction



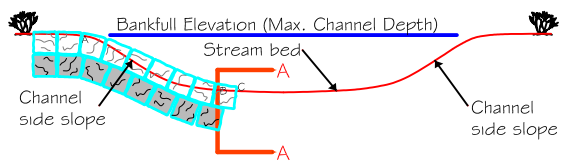
Plan View



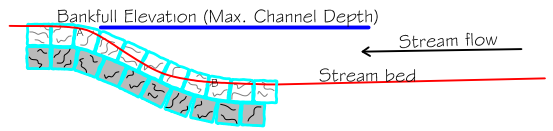
Plan View



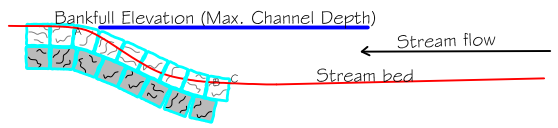
Cross Sectional View



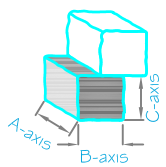
Cross Sectional View

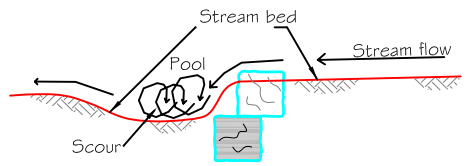


Profile view



Profile view

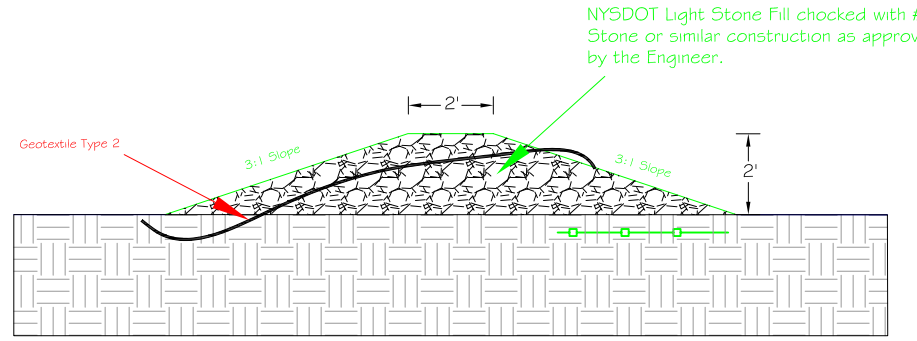




Rock Top/Footer Detail
Section A-A
Not to scale

Coffer Dam Detail

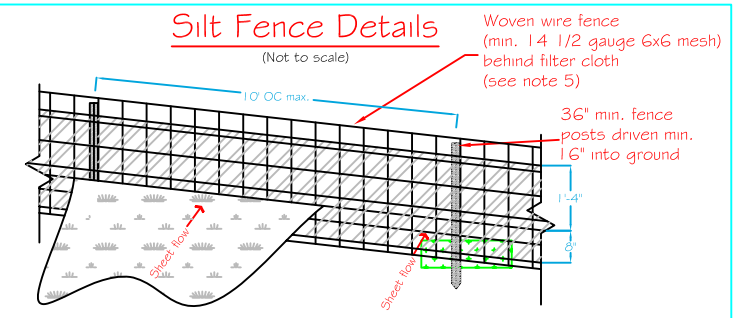
(Not to Scale)



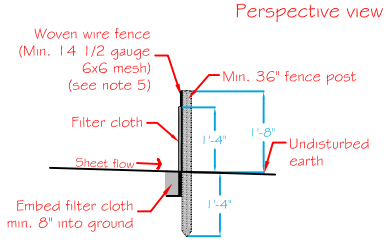
D:\Land Project R3\LDT Files Stream\Typicals\Stream Program\CofferDam.dwg

Silt Fence Details

(Not to scale)



Perspective view



Posts: Steel either "T" or "U" Type or 2" Hardwood
Fence: Woven Wire, 14½ Ga. 6" max. mesh opening
Filter Cloth: Filter X. Mirafi 100x, Stabilinka T140N or approved equal
Prefabricated unit: Geofab, Envirofence, or approved equal

Cross section view

Construction Notes for fabricated silt fence

1. Woven wire fence to be fastened securely to fence posts with wire ties or staples.
2. Filter cloth to be fastened securely to woven wire fence with ties spaced every 24" at top and mid section.
3. When two sections of filter cloth adjoin each other they shall be overlapped by six inches and folded.
4. Maintenance shall be performed as needed and material removed when "bulges" develop in the silt fence.
5. Pre-fabricated units do not require the use of woven wire fence.

Revision #1: Updated: May 8, 2003
D:\Land Project R3\LDT Files Stream\Typicals\Stream Program\silfence.dwg

Construction Notes

1. The construction of all structures will be done in the presence of the engineer or his designee.

2. The size and placement of scour holes will be determined by the engineer. See construction specifications.

3. The bank key for all rock structures will be a minimum of seven feet (7') in length, unless otherwise determined by the engineer.

David Post Stream Retrofit

Details
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

Delaware County Soil & Water Conservation District
44 West Street
Walton, NY 13856

		Date		
Designed	G. Neale	8-03-06	Approved by	
Drawn	G. Neale	8-30-06	Title	
Traced			Title	
Checked	S. Gladstone	9-06-06	Sheet No. 1 of 1	Drawing No. DE-C-SCMP-001a

Attachment E

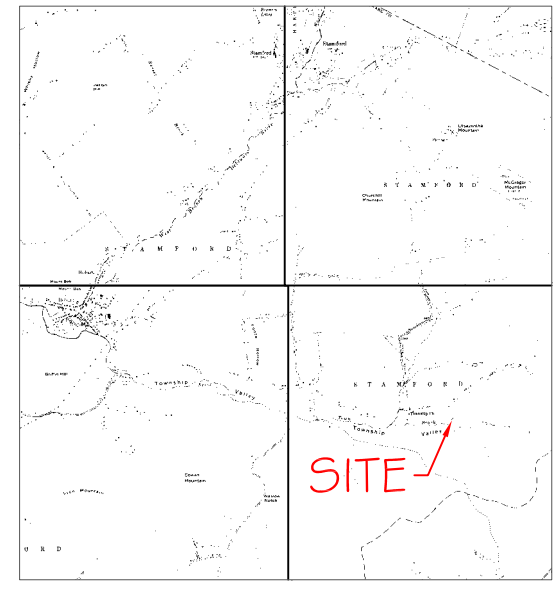
As-built Project Drawings and Project Specifications - Palmatier Farm

Stream Corridor Management Program

Delaware Co. SWCD

John Palmatier

Streambank Stabilization



N

SITE MAP

Dig Safely. New York
Underground Facilities Protective Organization
800-962-7962
www.**digsafelynewyork**.org
- ☐ **Call Before You Dig**
- ☐ **Wait The Required Time**
- ☐ **Confirm Utility Response**
- ☐ **Respect the Marks**
- ☐ **Dig With Care**

CONSTRUCTION NOTES

ALL WORK SHALL BE ACCOMPLISHED ACCORDING TO THE PLANS AND SPECIFICATIONS OF THE PROJECT. ANY CHANGES SHALL BE WITH PRIOR WRITTEN APPROVAL BY THE ENGINEER AND/OR CONTRACTING OFFICER.

AT LEAST TWO FULL WORKING DAYS PRIOR TO EXCAVATION, THE CONTRACTOR SHALL NOTIFY THE UNDERGROUND FACILITIES PROTECTION ORGANIZATION (U.F.P.O.) AT 1-800-962-7962 AND ANY OTHER LOCAL UTILITIES THAT MAY BE IN THE AREA.

THE CONTRACTOR SHALL GIVE THE DCSWCD AND THE LANDOWNER/OPERATOR A MINIMUM OF TWO FULL WORKING DAYS NOTICE PRIOR TO CONSTRUCTION.

ALL CONSTRUCTION PRACTICES SHALL BE IN ACCORDANCE WITH O.S.H.A. STANDARDS AND REGULATIONS PART 1910 AND 1926. ALL TRENCH EXCAVATIONS IN UNSTABLE SOILS OR IN TRENCHES GREATER THAN FIVE FEET DEEP SHALL BE SLOPED, SHORED, OR SHIELDED ACCORDING TO O.S.H.A. PART 1926.

CONTENTS

I HAVE REVIEWED THE DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT. THE PROJECT HAS BEEN EXPLAINED TO ME FULLY, AND I AGREE WITH ALL TECHNICAL ASPECTS OF THE PROJECT.

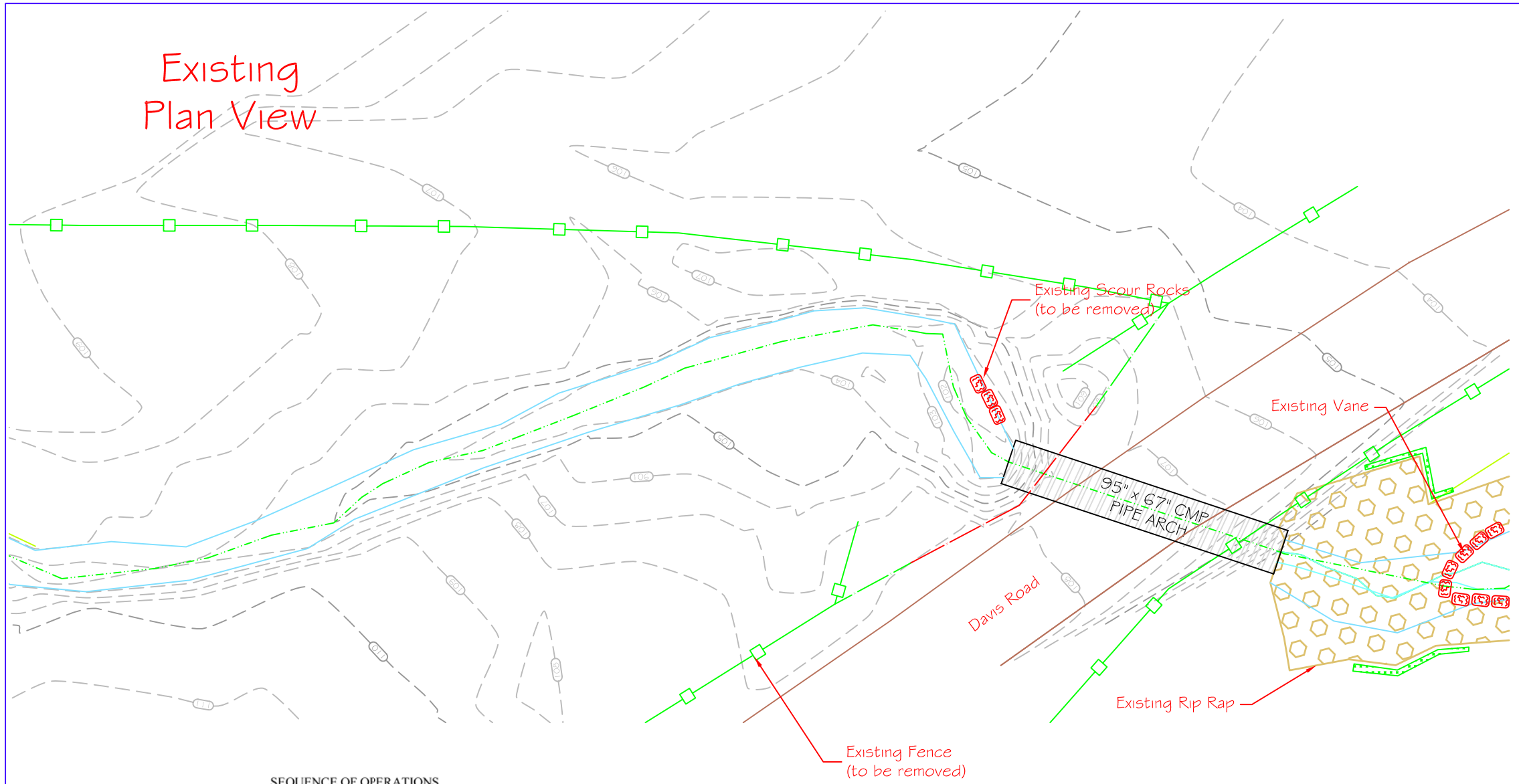
LANDOWNER'S SIGNATURE:_____ DATE:_____

John Palmatier
Streambank Stabilization
Title Sheet
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

Delaware County Soil & Water Conservation District
44 West Street
Walton, NY 13856

Designed G. Neale	Date 5-5-06	Approved by	
Drawn G. Neale	9-06-06	Title	
Traced		Title	
Checked S. Gladstone	9-07-06	Sheet No. of	Drawing No. DE-C-SCMP-009

Existing Plan View



LEGEND

- Existing Edge Stream
- Existing Thalweg
- Existing Fence
- Road Edge
- Existing Major Contour
- Existing Minor Contour
- Existing Culvert Pipe
- Existing Rip Rap

Not To Scale

SEQUENCE OF OPERATIONS

I. Mobilization & Preliminary Operations
- A. Install temporary fence.
- B. Construct Rock Storage Area and Temporary Storage Area.
- C. Construct filter fence at both storage areas.
- D. Place any stripped topsoil in the Temporary Storage Area.
- E. Place any other earthwork material in the Temporary Storage Area; keep it separate from the topsoil.
- F. Cover topsoil with mulch or plastic.

II. Work at 0+50 +/- to 1+50 +/-
- A. Construct coffer dam and install pumps at 0+50 +/-.
- B. Install hose(s) and pump water to 2+00 +/-.
- C. Grade channel and banks to the elevations as shown on the plans and cross-sections. Store any excess material in the Temporary Storage Area.
- D. Install Cross Vane at 0+60.
- E. Construct rip-rap at the locations and elevations as shown on the plans and cross-sections.
- F. Remove coffer dam, hoses and pumps.

III. Seeding & Planting
- A. Seed and mulch all disturbed areas in accordance with the plans and specifications.
- B. Install Erosion Control Mat as shown on the plans and cross-sections.
- C. Install Live Stakes in accordance with the plans and specifications.

IV. Cleanup and Demobilization
- A. Remove filter fence, clean up storage areas, including seeding, mulching and regrading.
- B. Remove all equipment, tools, and unused materials from site.

John Palmatier
Streambank Stabilization
Existing Plan View
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

Delaware County Soil & Water Conservation District
44 West Street
Walton, NY 13856

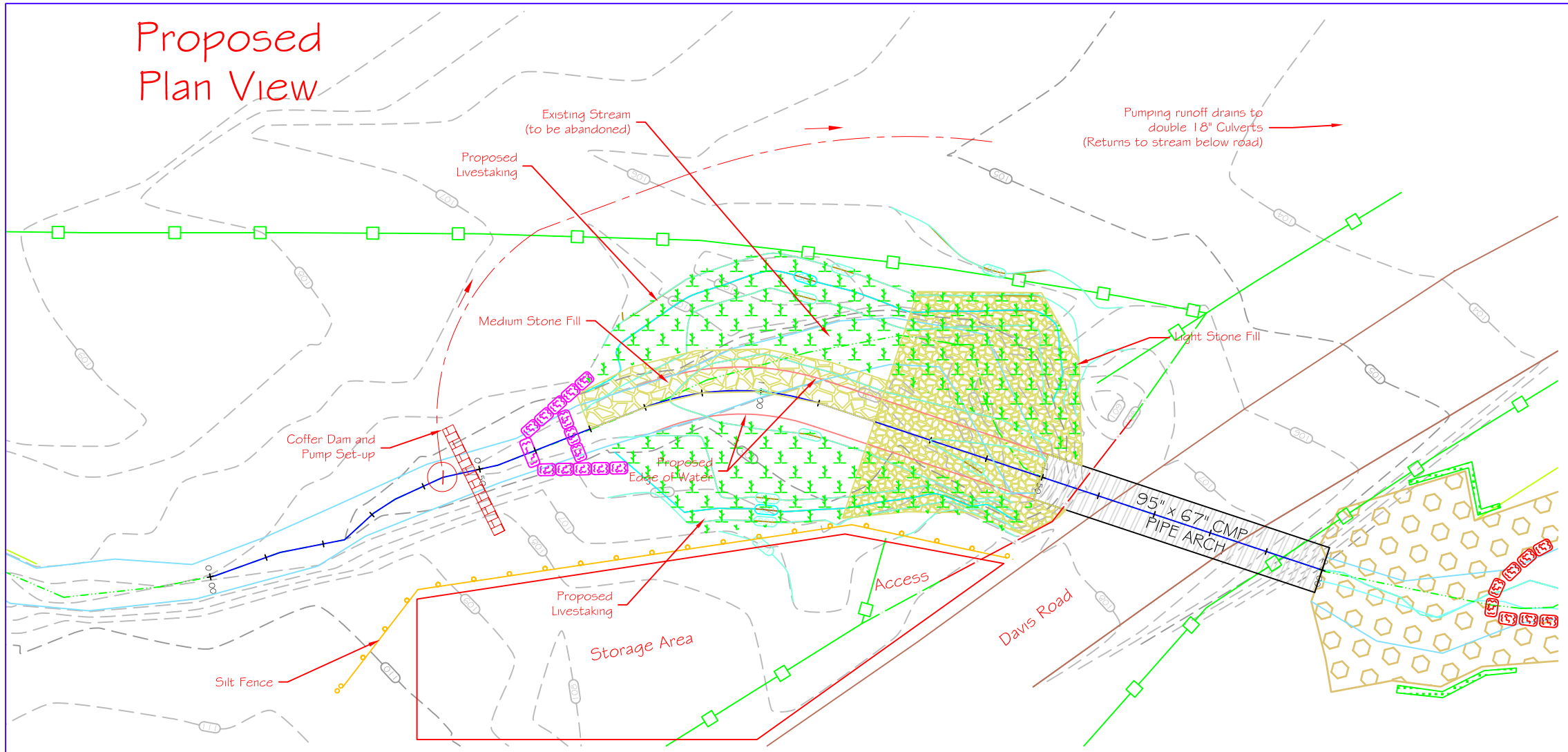
	Name	Date
Designed	G. Neale	5-5-06
Drawn	G. Neale	9-06-06
Traced		
Checked	S. Gladstone	9-07-06

Approved by: _____
Title: _____
Title: _____

Sheet No. 2 of 5

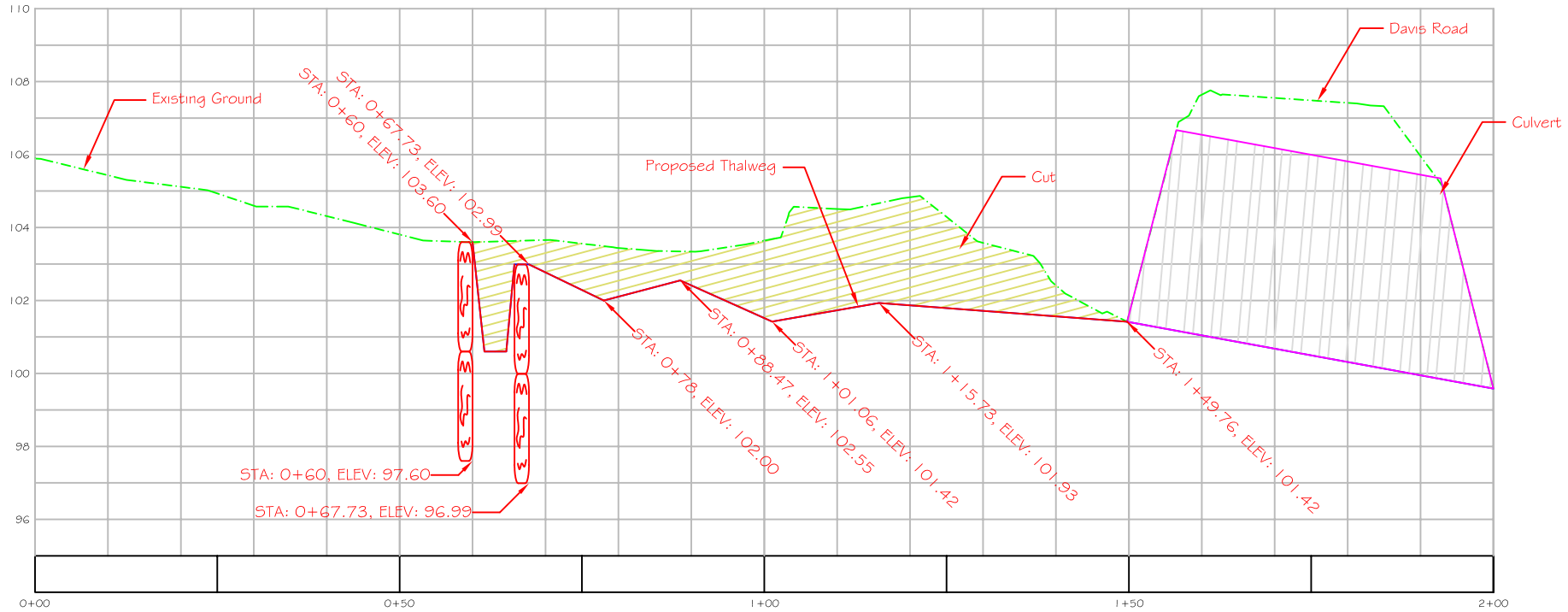
Drawing No. DE-C-SCMP-009

Proposed Plan View



LEGEND

- Existing Edge Stream
- Existing Thalweg
- Existing Fence
- Road Edge
- Existing Contour
- Proposed Contour
- Proposed Centerline
- Proposed Edge Stream
- Proposed Light Stone Fill
- Proposed Medium Stone Fill
- Proposed Livestaking
- Bypass Pump setup
- Coffer Dam
- Existing Culvert Pipe
- Existing Rip Rap



Proposed Profile

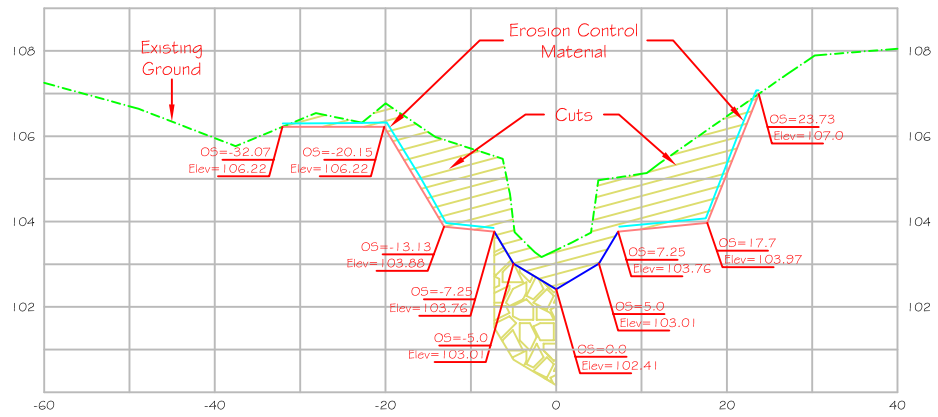
Not To Scale

John Palmatier
Streambank Stabilization
Proposed Plan View & Profile
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

Delaware County Soil & Water Conservation District
44 West Street
Walton, NY 13856

		Date		
Designed	G. Neale	5-5-06	Approved by	
Drawn	G. Neale	9-06-06	Title	
Traced			Title	
Checked	S. Gladstone	9-07-06	Sheet No. 3 of 5	Drawing No. DE-C-SCMP-009

0+90



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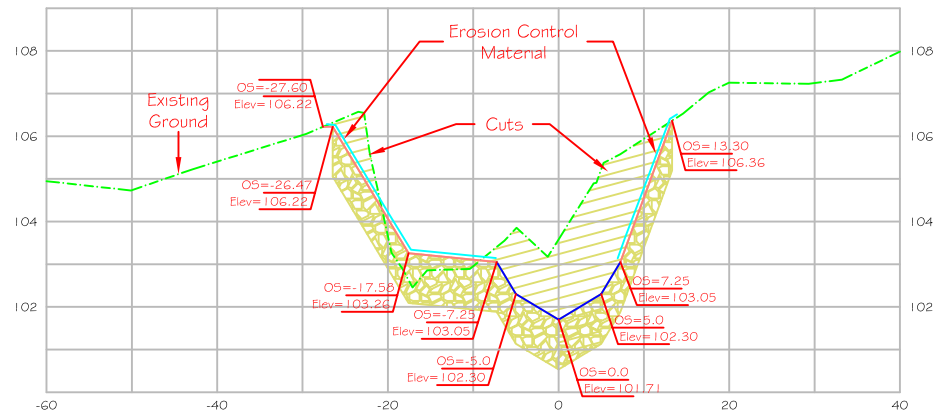

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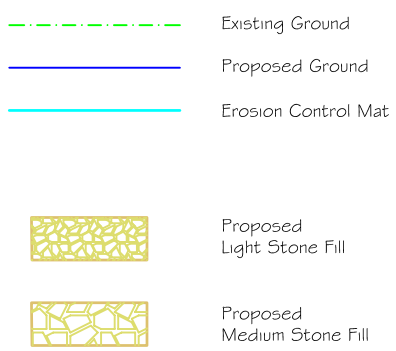

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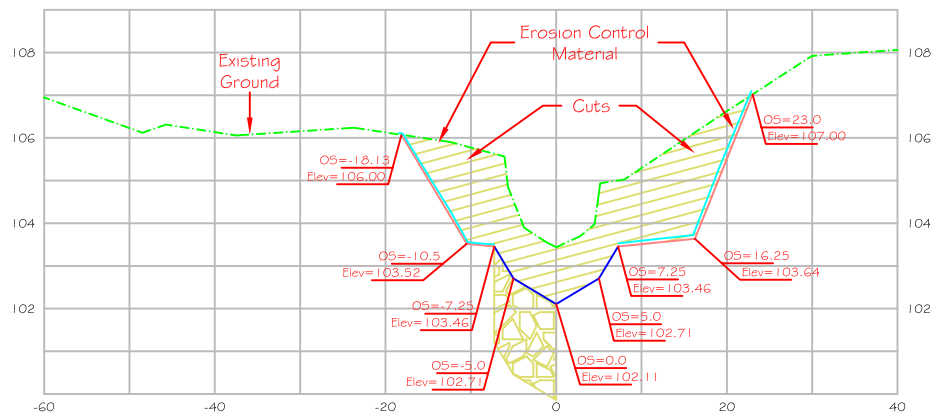

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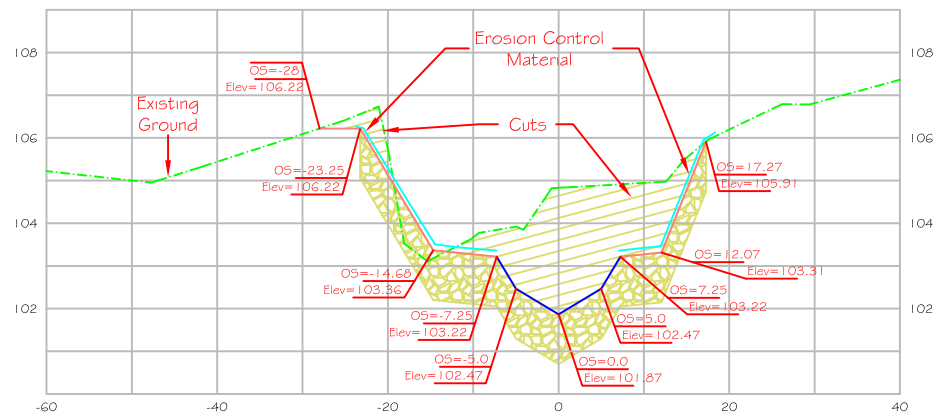

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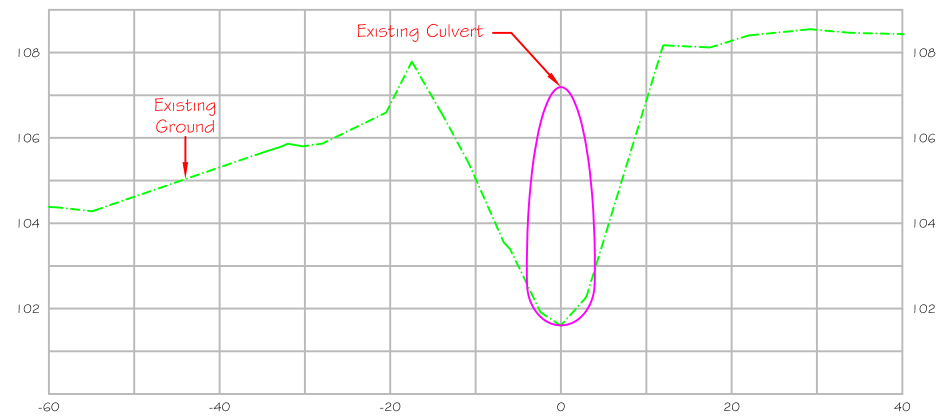

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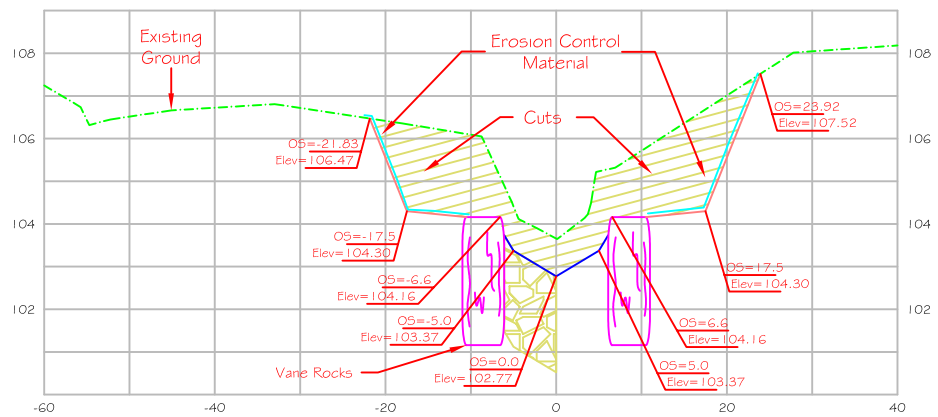

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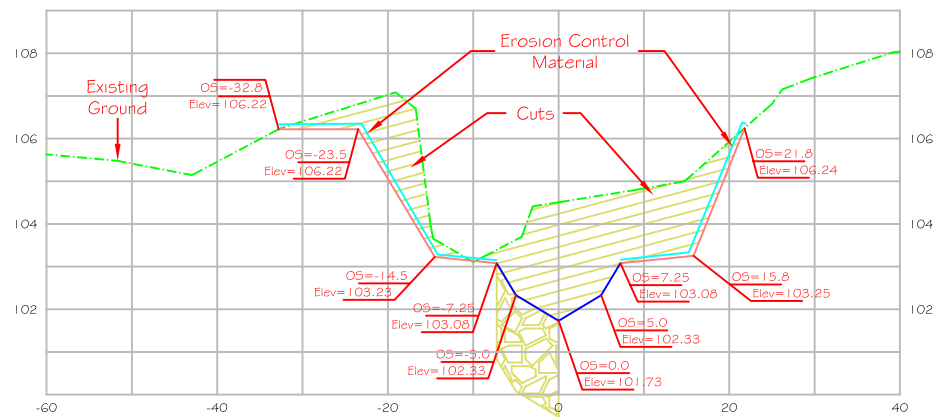

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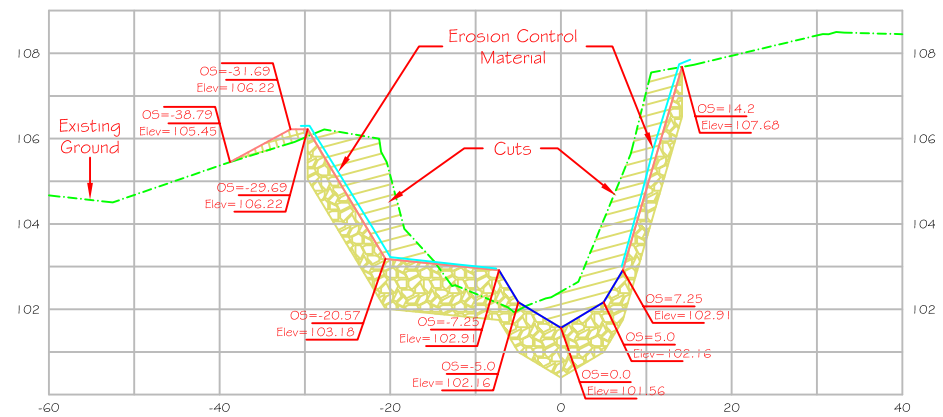

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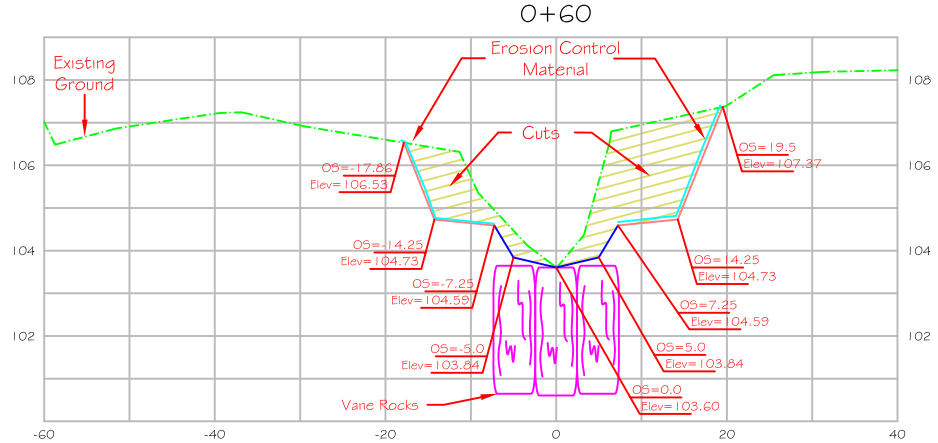

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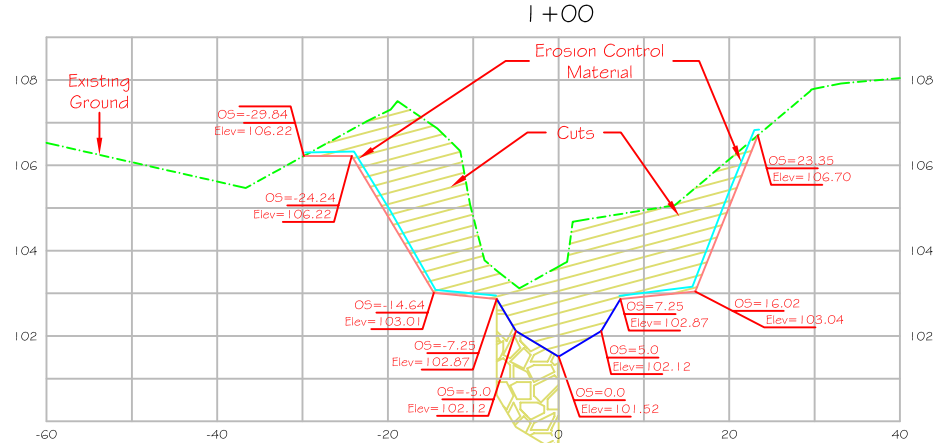


Not To Scale

John Palmatier
Streambank Stabilization
Cross Sections
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

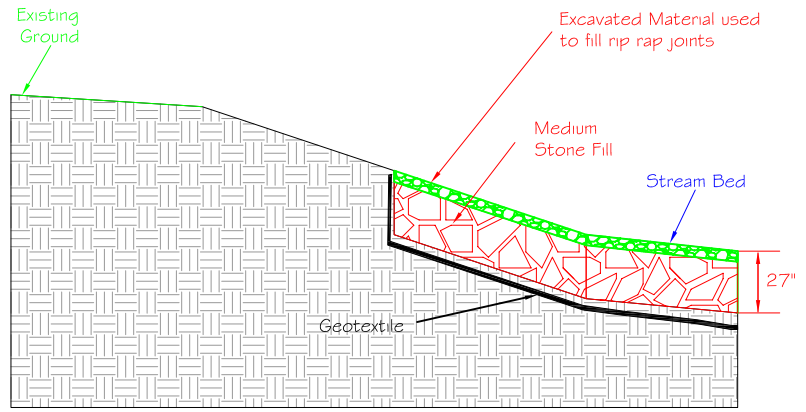
Delaware County Soil & Water Conservation District
44 West Street
Walton, NY 13856

		Date	Approved by	
Designed	G. Neale	5-5-06		
Drawn	G. Neale	9-06-06	Title	
Traced			Title	
Checked	S. Gladstone	9-07-06	Sheet No. 4 of	Drawing No. DE-C-SCMP-009

Vane Details

Use Schematically for Vane Bar Construction

Rip Rap Detail
In channel
(Not to Scale)



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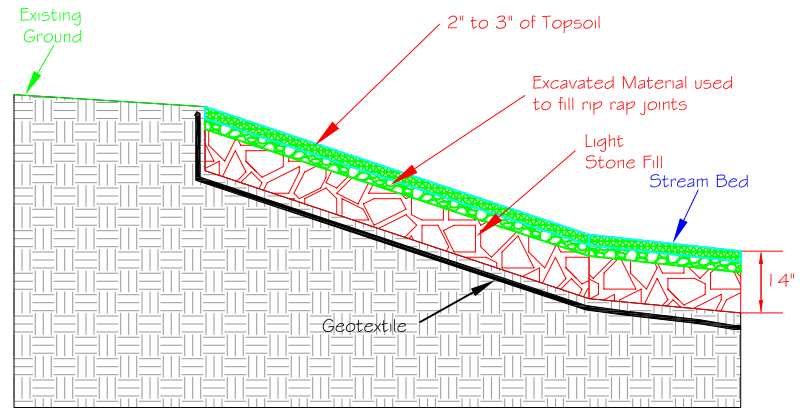
Rip Rap Detail
Flood Prone areas and Banks
(Not to Scale)



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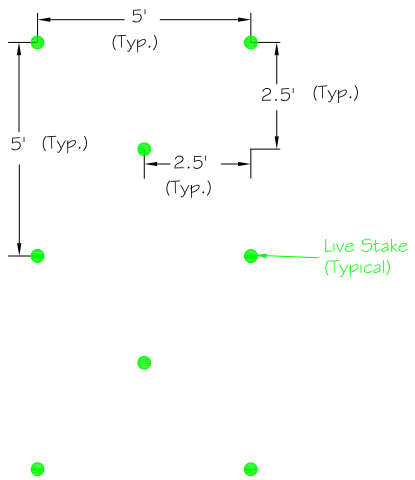
Live Stake Layout
(Not to Scale)



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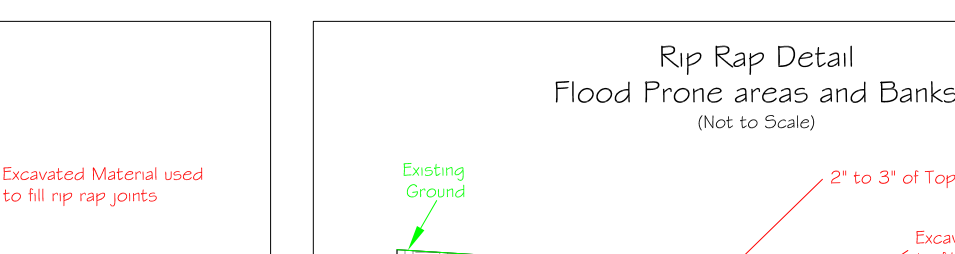
Coffer Dam Detail
(Not to Scale)



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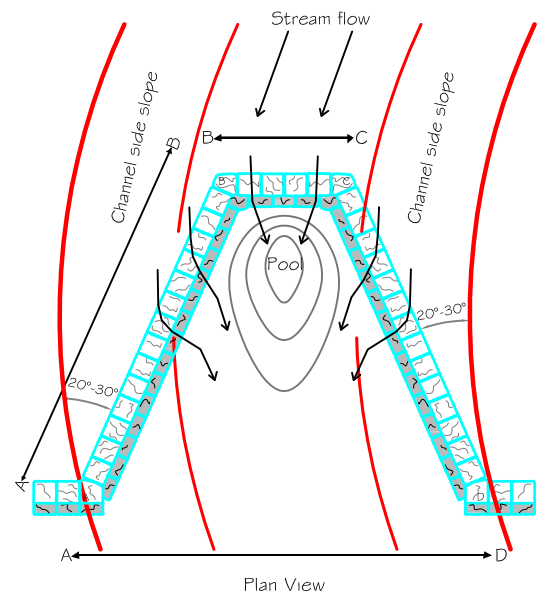
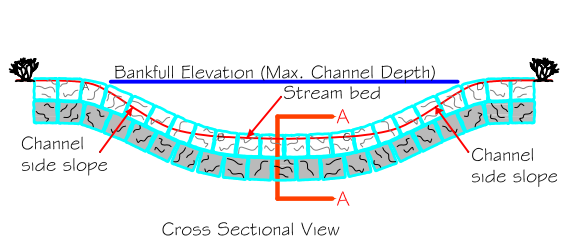
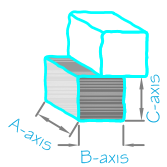
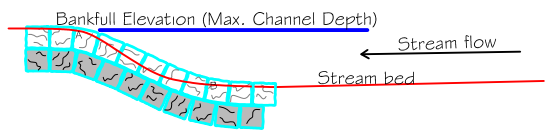


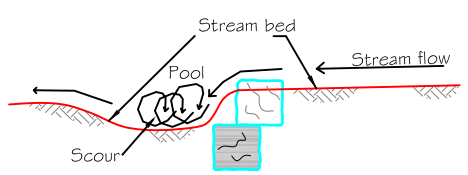


Cross Sectional View





Profile view



Rock Top/Footer Detail
Section A-A
Not to scale

Construction Notes

1. The construction of all structures will be done in the presence of the engineer or his designee.

2. The size and placement of scour holes will be determined by the engineer. See construction specifications.

3. The bank key for all rock structures will be a minimum of seven feet (7') in length, unless otherwise determined by the engineer.

John Palmatier
Streambank Stabilization
Details
Delaware Co. Stream Corridor Management Program
Delaware Co., NY

Delaware County Soil & Water Conservation District
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Walton, NY 13856

		Date		
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Drawn	G. Neale	9-06-06	Title	
Traced			Title	
Checked	S. Gladstone	9-07-06	Sheet No. 5 of 5	Drawing No. DE-C-SCMP-009