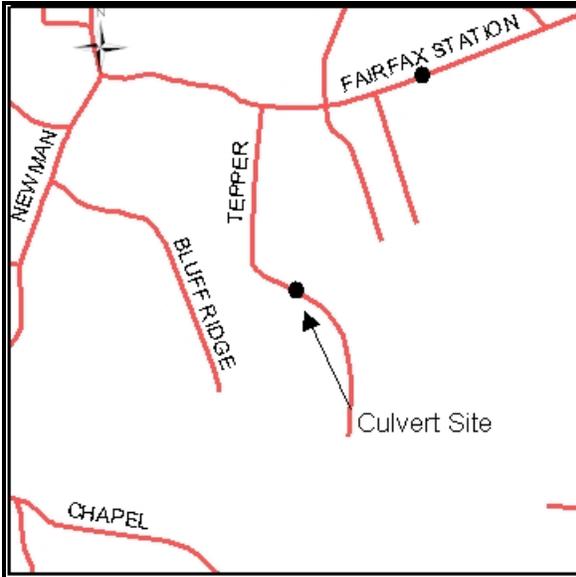


Appendix I: Culvert Retrofit Projects

Tepper Culvert Retrofit

Culvert Location: Tepper Drive.
Project ID: PH9502 (PH3-CR-3)
Ownership:
Type of Culvert: 18" Concrete Pipe.



Vicinity Map.



Culvert Overview.



Upstream View.



Downstream View.

Drainage Area: 9 acres.
Retrofit Possibilities: Install a 2 foot tall gabion dam upstream of the culvert. This will create a micro-pool in the shallow swale in the upstream wooded area.
Benefit: Stormwater quality control.
Estimated Cost: \$40,000.

Culvert Retrofit Costs

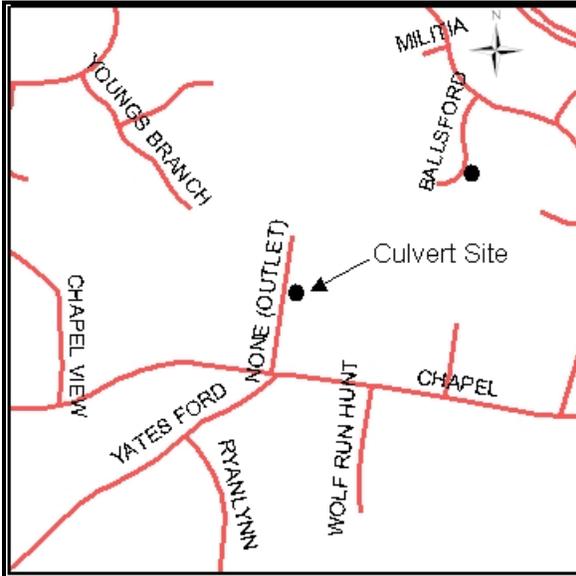
Site: Tepper
Project ID: PH9502

Drainage Area = 9 acres

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
Clear and Grub	0.15	AC	\$ 5,865.00	\$ 879.75
Excavation	121.00	CY	\$ 26.50	\$ 3,206.50
Planting	0.10	AC	\$ 10,000.00	\$ 1,000.00
Gabions (2' x 3' x 100')	22.00	CY	\$ 145.00	\$ 3,190.00
Subtotal Construction Cost =				\$ 8,276.00
Mobilization and Erosion Control (10%) =				\$ 828.00
100 Year Flood Limit/Encroachment Analysis =				\$ 10,000.00
Subtotal 1 =				\$ 19,104.00
Contingency (25%) =				\$ 4,776.00
Subtotal 2 =				\$ 23,880.00
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%) =				\$ 10,746.00
Total =				\$ 34,626.00
ESTIMATED PROJECT COST =				\$ 40,000.00

Yates Ford Road Culvert Retrofit

Culvert Location: Private Driveway.
Project ID: PH9504 (PH3-CR-4)
Ownership: Private.
Type of Culvert: 30" corrugated metal pipe.



Vicinity Map.



Culvert Overview.



Upstream View.



Downstream View.

Drainage Area: 9 acres.
Retrofit Possibilities: Install a 2' high gabion dam upstream to detain and infiltrate the first flush (0.1 – 0.2 inches) of a storm.
Benefit: Stormwater quality control.
Estimated Cost: \$50,000.

Culvert Retrofit Costs

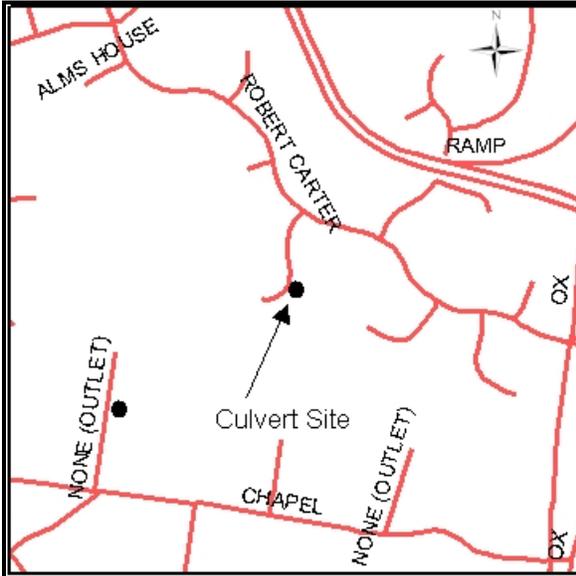
Site: Yates Ford
Project ID: PH9504

Drainage Area = 9 acres

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
Clear and Grub	0.2	AC	\$ 8,798.00	\$ 1,319.70
Excavation	121	CY	\$ 26.50	\$ 3,206.50
Planting	0.15	AC	\$ 10,000.00	\$ 1,500.00
Gabions (2' x 3' x 190')	43	CY	\$ 145.00	\$ 6,235.00
Subtotal Construction Cost =				\$ 12,261.00
Mobilization and Erosion Control (10%) =				\$ 1,226.00
100 Year Flood Limit/Encroachment Analysis =				\$ 10,000.00
Subtotal 1 =				\$ 23,487.00
Contingency (25%) =				\$ 5,872.00
Subtotal 2 =				\$ 29,359.00
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%) =				\$ 13,212.00
Total =				\$ 42,571.00
ESTIMATED PROJECT COST =				\$ 50,000.00

Balls Ford Road Culvert Retrofit

Culvert Location: Balls Ford Road.
Project ID PH9505 (PH3-CR-1)
Ownership:
Type of Culvert: 30" concrete pipe.



Vicinity Map.



Culvert Overview.



Upstream View.



Downstream View.

Drainage Area: 35 acres.
Retrofit Possibilities: Install a 3' high gabion dam upstream to detain and infiltrate the first flush (0.1 – 0.2 inches) of a storm.
Have gabion dam detain flow from concrete "V" ditches from road.
Benefit: Stormwater quality control.
Estimated Cost: \$70,000.

Culvert Retrofit Costs

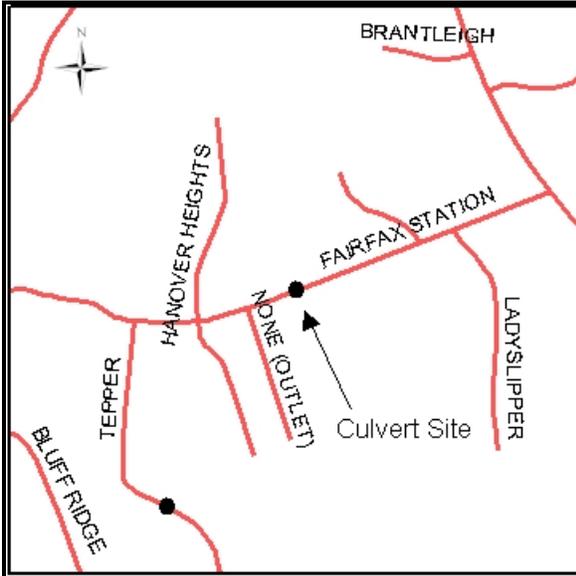
Site: Balls Ford
Project ID: PH9505

Drainage Area = 35 acres

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
Clear and Grub	0.6	AC	\$ 8,798.00	\$ 5,132.17
Excavation	471	CY	\$ 26.50	\$ 12,469.72
Planting	0.15	AC	\$ 10,000.00	\$ 1,500.00
Gabions (3' x 3' x 100')	33	CY	\$ 145.00	\$ 4,785.00
Subtotal Construction Cost =				\$ 23,887.00
Mobilization and Erosion Control (10%) =				\$ 2,389.00
100 Year Flood Limit/Encroachment Analysis =				\$ 10,000.00
Subtotal 1 =				\$ 36,276.00
Contingency (25%) =				\$ 9,069.00
Subtotal 2 =				\$ 45,345.00
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%) =				\$ 20,405.00
Total =				\$ 65,750.00
ESTIMATED PROJECT COST =				\$ 70,000.00

Fairfax Station Culvert Retrofit

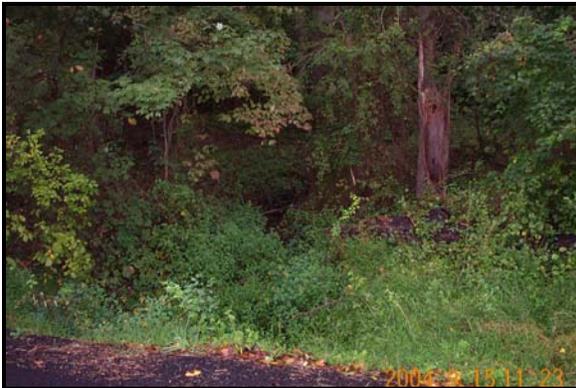
Culvert Location: Fairfax Station Road.
Project ID: PH9512 (PH3-CR-2)
Ownership:
Type of Culvert



Vicinity Map.



Culvert Overview.



Upstream View.



Downstream View.

Drainage Area (ac): 26 acres.
Retrofit Possibilities: Remove blockage within culvert.
Install a 3' high gabion dam upstream to detain and infiltrate the first flush (0.1 – 0.2 inches) of a storm.
Benefit: Stormwater quality control.
Estimated Cost: \$70,000.

Culvert Retrofit Costs

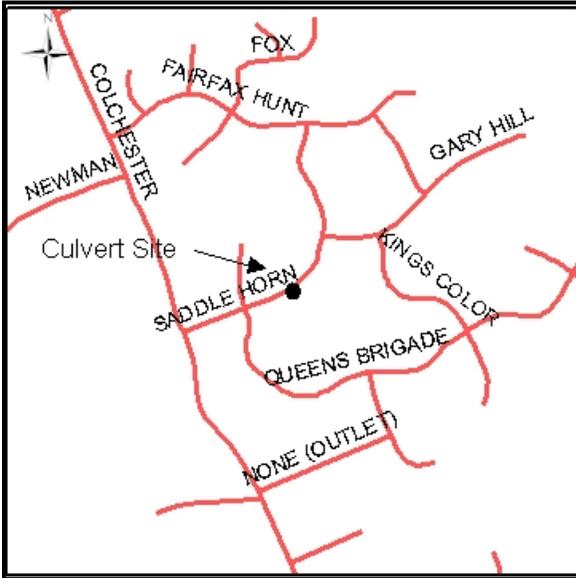
Site: Fairfax Station
Project ID: PH9512

Drainage Area = 26 acres

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
Clear and Grub	0.4	AC	\$ 8,798.00	\$ 3,812.47
Excavation	350	CY	\$ 26.50	\$ 9,263.22
Planting	0.15	AC	\$ 10,000.00	\$ 1,500.00
Gabions (3' x 3' x 190')	63	CY	\$ 145.00	\$ 9,135.00
Subtotal Construction Cost =				\$ 23,711.00
Mobilization and Erosion Control (10%) =				\$ 2,371.00
100 Year Flood Limit/Encroachment Analysis =				\$ 10,000.00
Subtotal 1 =				\$ 36,082.00
Contingency (25%) =				\$ 9,021.00
Subtotal 2 =				\$ 45,103.00
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%) =				\$ 20,296.00
Total =				\$ 65,399.00
ESTIMATED PROJECT COST =				\$ 70,000.00

Saddle Horn Culvert Retrofit

Culvert Location: Saddle Horn Road.
Project ID PH9530 (CC-CR-1)
Ownership:
Type of Culvert 24" round concrete pipe.



Vicinity Map.



Culvert Overview.



Upstream View.

Downstream View.

Drainage Area: 15 acres.
Retrofit Possibilities: Install a 3' high gabion dam upstream to detain and infiltrate the first flush (0.1 – 0.2 inches) of a storm.
Remove invasive/exotic plants and replant with native vegetation.
Benefit: Stormwater quality control.
Estimated Cost: \$60,000.

Culvert Retrofit Costs

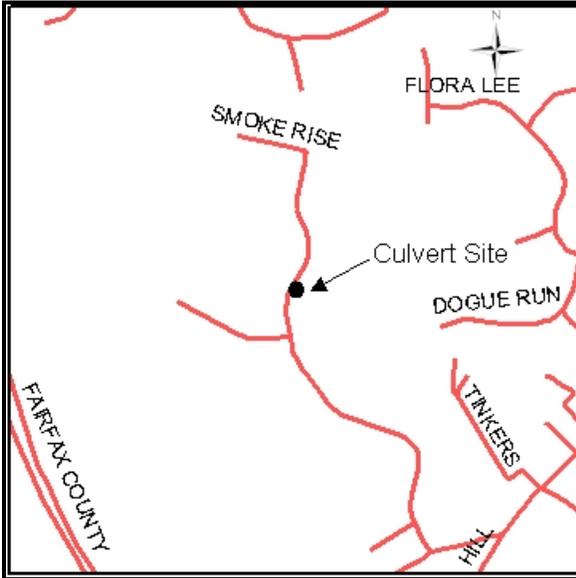
Site: Saddle Horn
Project ID: PH9530

Drainage Area = 15 acres

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
Clear and Grub	0.3	AC	\$ 5,865.00	\$ 1,466.25
Excavation	202	CY	\$ 26.50	\$ 5,344.17
Planting	0.15	AC	\$ 10,000.00	\$ 1,500.00
Gabions (3' x 3' x 200')	66	CY	\$ 145.00	\$ 9,570.00
Subtotal Construction Cost =				\$ 17,880.00
Mobilization and Erosion Control (10%) =				\$ 1,788.00
100 Year Flood Limit/Encroachment Analysis =				\$ 10,000.00
Subtotal 1 =				\$ 29,668.00
Contingency (25%) =				\$ 7,417.00
Subtotal 2 =				\$ 37,085.00
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%) =				\$ 16,688.00
Total =				\$ 53,773.00
ESTIMATED PROJECT COST =				\$ 60,000.00

Smoke Rise Road Culvert Retrofit

Culvert Location: Smoke Rise Road.
Project ID: PH9540 (PB2-CR-1)
Ownership:
Type of Culvert: 48" corrugated metal pipe.



Vicinity Map.



Culvert Overview.



Upstream View.



Downstream View.

Drainage Area: 24 acres.
Retrofit Possibilities: Install a 3' high gabion dam upstream to detain and infiltrate the first flush (0.1 – 0.2 inches) of a storm.
Benefit: Stormwater quality control.
Estimated Cost: \$60,000.

Culvert Retrofit Costs

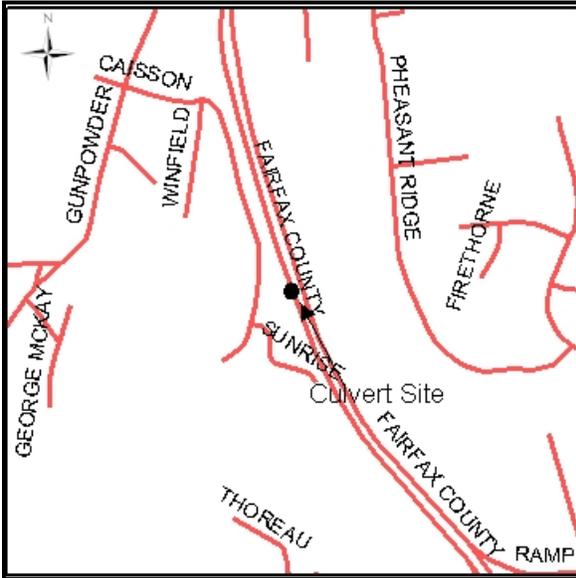
Site: Smoke Rise
Project ID: PH9540

Drainage Area = 24 acres

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
Clear and Grub	0.4	AC	\$ 8,798.00	\$ 3,519.20
Excavation	323	CY	\$ 26.50	\$ 8,550.67
Planting	0.15	AC	\$ 10,000.00	\$ 1,500.00
Gabions (3' x 3' x 120')	40	CY	\$ 145.00	\$ 5,800.00
Subtotal Construction Cost =				\$ 19,370.00
Mobilization and Erosion Control (10%) =				\$ 1,937.00
100 Year Flood Limit/Encroachment Analysis =				\$ 10,000.00
Subtotal 1 =				\$ 31,307.00
Contingency (25%) =				\$ 7,827.00
Subtotal 2 =				\$ 39,134.00
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%) =				\$ 17,610.00
Total =				\$ 56,744.00
ESTIMATED PROJECT COST =				\$ 60,000.00

Fairfax County Parkway Culvert Retrofit

Culvert Location: Fairfax County Parkway.
Project ID: PH9580 (PB-CR-1)
Ownership: Public.
Type of Culvert: 36" x 48" concrete elliptical pipe.



Vicinity Map.



Culvert Overview.



Upstream View.



Downstream View.

Drainage Area: 50 acres.
Retrofit Possibilities: Install a 4' high gabion dam upstream of Caisson Road to detain and infiltrate the first flush (0.1 – 0.2 inches) of a storm.
Benefit: Stormwater quality control.
Estimated Cost: \$90,000.

Culvert Retrofit Costs

Site: Fairfax County Parkway
Project ID: PH9580

Drainage Area = 50 acres

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
Clear and Grub	0.8	AC	\$ 8,798.00	\$ 7,331.67
Excavation	672	CY	\$ 26.50	\$ 17,813.89
Planting	0.15	AC	\$ 10,000.00	\$ 1,500.00
Gabions (4' x 3' x 140')	62	CY	\$ 145.00	\$ 8,990.00
Subtotal Construction Cost =				\$ 35,636.00
Mobilization and Erosion Control (10%) =				\$ 3,564.00
100 Year Flood Limit/Encroachment Analysis =				\$ 10,000.00
Subtotal 1 =				\$ 49,200.00
Contingency (25%) =				\$ 12,300.00
Subtotal 2 =				\$ 61,500.00
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%) =				\$ 27,675.00
Total =				\$ 89,175.00
ESTIMATED PROJECT COST =				\$ 90,000.00