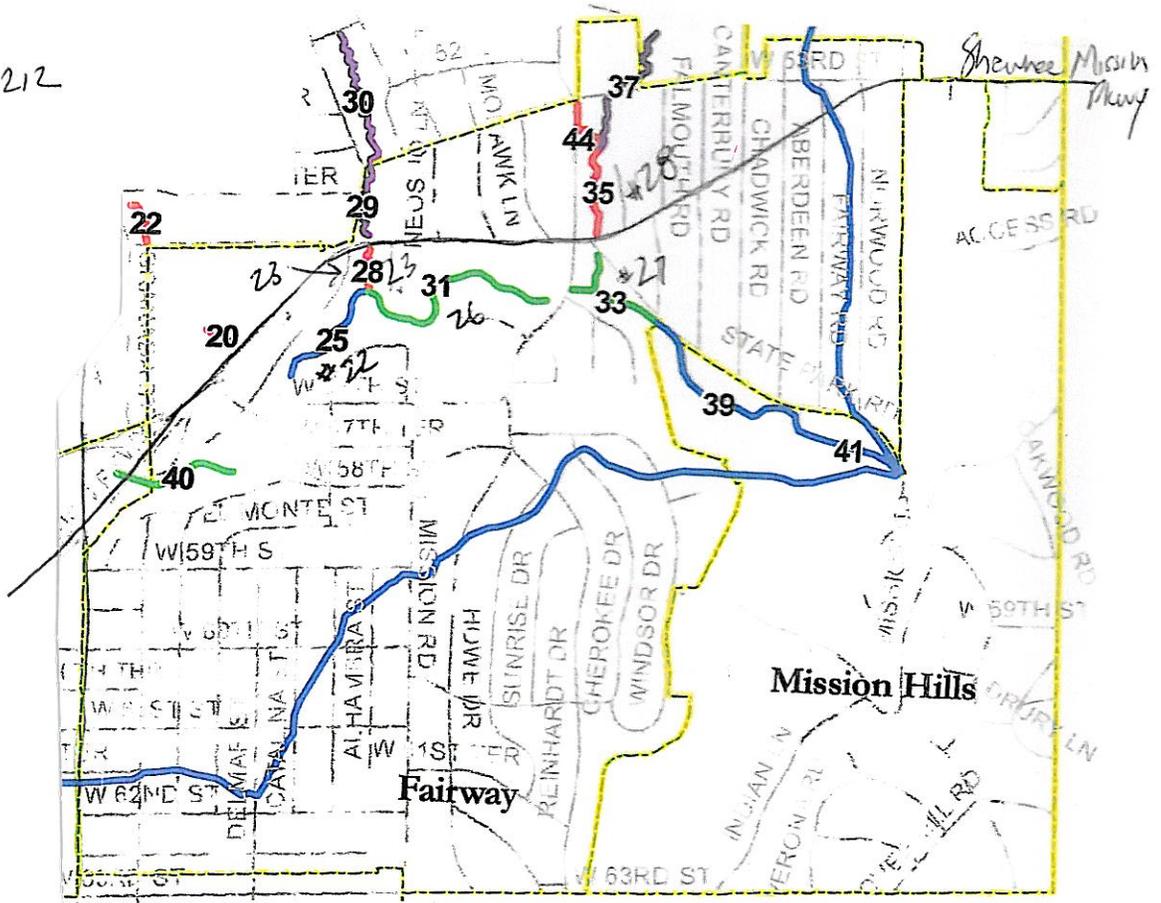


**Rock Creek Watershed
Feasibility Study**

**Appendix C-1
Proposed Stream
Restoration Projects**

35 is RC 1212



1 inch equals 1,500 feet



LEGEND

- High Priority
- Moderate Priority
- Lower Priority
- Interjurisdictional Projects
- RockCreekWatershed
- City Boundary

Map C1 #20

Fairway Rj #1

25. Improvement Project 23

W side of Neosho - Soar Smiley

PRIORITY 1

The existing length of this reach (Reach ID 16) is 308 feet, and its 2-year flow is 100 cfs. The low cost of restoring this reach produced a high priority rank.

However, restoration potential and influence are limited by completion of this project alone. The following parameters were determined based on Soar and Thorne criteria for a 100 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	11
Wave Length (L)	126
Pool-riffle Spacing	63
Radius of Curvature (Rc)	27
Range*	22-56
Amplitude (Amp)	20

* Absolute minimum - APWA maximum

Issues:

- Some signs of instability and erosion on both banks.
- Significant sediment deposition of silts, limiting soil gradation.



Project 23

P1

Optimal Restoration: \$43,214

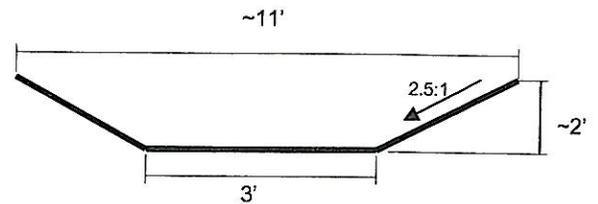
- Add meandering pattern to channel
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel

Limited Restoration: \$27,675

- Limited vegetation of banks
- Provide rip rap/bank protection of channel



Project 23



Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$ 43,214; Priority 1
- Optimal Restoration with Land Acquisition = \$149,356
- Limited Restoration = \$ 27,675

26. Improvement Project 24

PRIORITY 2

The existing length of this reach (Reach ID 18, 17) is 593 feet, and its 2-year flow is approximately 100 cfs. The following parameters were determined based on Soar and Thorne criteria for a 100 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	11
Wave Length (L)	126
Pool-riffle Spacing	63
Radius of Curvature (Rc)	27
Range*	22-56
Amplitude (Amp)	20

* Absolute minimum – APWA maximum

Issues:

- Significant down-cutting, instability and erosion
- Lack of native vegetation and stream corridor.



Project 24

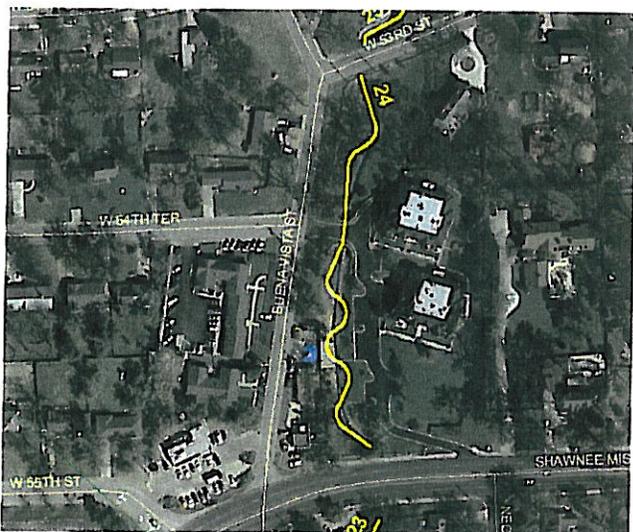
#2

Optimal Restoration:

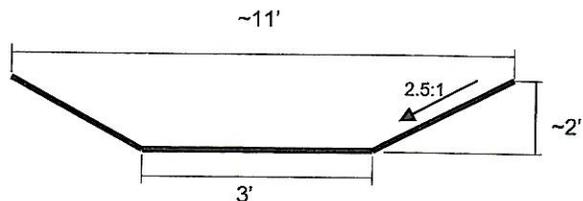
- Add meandering pattern to channel
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel as necessary

Limited Restoration:

- Limited vegetation of banks
- Provide rip rap/bank protection of channel as necessary



Project 24



Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$ 78,011; Priority 2
- Optimal Restoration with Land Acquisition = \$154,281
- Limited Restoration = \$ 52,709

P2

31. Improvement Project 36

PRIORITY 5

The existing length of this reach (Reach ID 9, 11) is 481 feet, and its 2-year flow is 175 cfs. The following parameters were determined based on Soar and Thorne criteria for a 175 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	15
Wave Length (L)	167
Pool-riffle Spacing	83
Radius of Curvature (Rc)	36
Range*	30-74
Amplitude (Amp)	27

* Absolute minimum – APWA maximum

Issues:

- Some signs of instability and erosion on both banks



Project 36 44

Indian Mission

#3

Optimal Restoration:

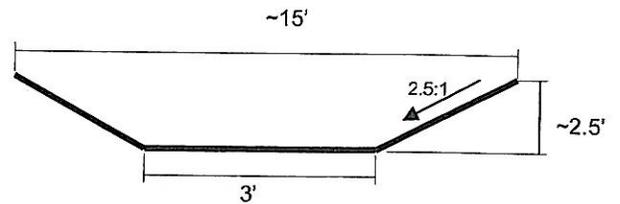
- Add meandering pattern to channel
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel

Limited Restoration:

- Limited vegetation of banks
- Provide rip rap/bank protection of channel



Project 36 Indian Mission ↖ NW 1/2



Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$ 63,516; Priority 5
- Optimal Restoration with Land Acquisition = \$63,516 (Public Land)
- Limited Restoration = \$ 50,973

P5

C1 # 37

#4

30.Improvement Project 30

PRIORITY: 7

The existing length of this reach (Reach ID 7, 8) is 1109 feet, and its 2-year flow is approximately 150 cfs. The following parameters were determined based on Soar and Thorne criteria for a 150 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	14
Wave Length (L)	154
Pool-riffle Spacing	77
Radius of Curvature (Rc)	33
Range*	27-69
Amplitude (Amp)	25

* Absolute minimum – APWA maximum

Issues:

- Some signs of instability and erosion on both banks
- Lack of vegetated stream corridor



Project 30 Inlet Missing NE section w/ Roaded Bank

P7

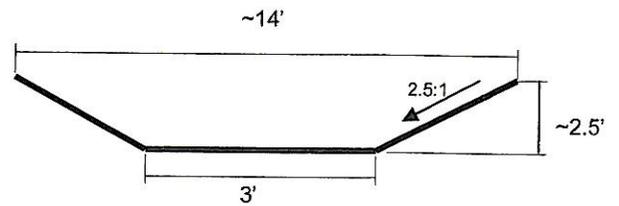
#4

Optimal Restoration:

- Develop stable cross section
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel

Limited Restoration:

- Limited vegetation of banks
- Provide rip rap/bank protection of channel



Project 30 Indian Mission NE side 2/2

Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$ 113,883; Priority 7
- Optimal Restoration with Land Acquisition = \$209,993
- Limited Restoration = \$ 76,997

P7

Map C1 #20 1-2

19. Improvement Project 18

PRIORITY 8

This short reach (Reach ID 93) extends only 236 feet, and its 2-year flow is 156 cfs. The following parameters were determined based on Soar and Thorne criteria for a 156 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	14
Wave Length (L)	158
Pool-riffle Spacing	79
Radius of Curvature (Rc)	34
Range*	28-70
Amplitude (Amp)	25

* Absolute minimum – APWA maximum

Issues:

- Existing channel experiencing degradation.
- Concrete channels provide little habitat or water quality value, increase flow velocities and possibly contribute to downstream flooding concerns.



Project 18

Fairway Office Park catch basin

Map C1 #20 2-2

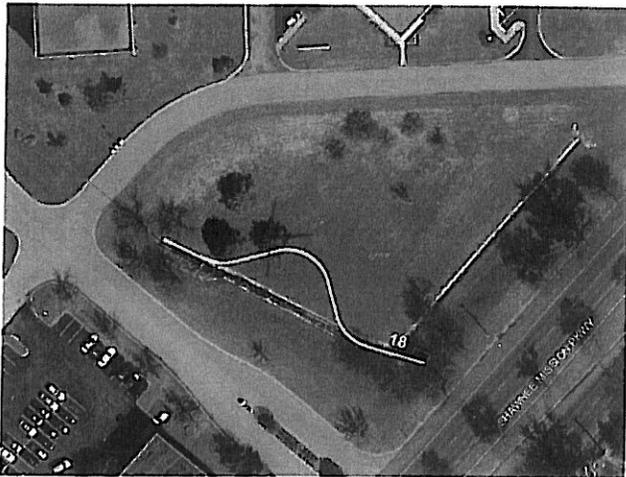
#5

Optimal Restoration:

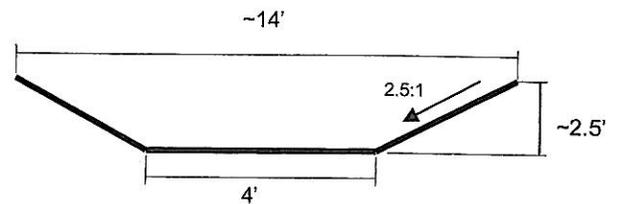
- Add meandering pattern to channel
- Replace concrete channel with stable cross section.
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel

Limited Restoration:

- Replace concrete channel with stable cross section
- Limited vegetation of banks
- Provide rip rap/bank protection of channel



Project 18



Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$ 48,481; Priority 8
- Optimal Restoration with Land Acquisition = \$48,481 (Public Land)
- Limited Restoration = \$ 38,127

PB

Map C1 #35

#6

29. Improvement Project 29

PRIORITY 17

The existing length of this reach (Reach ID 3, 5, 6) is 767 feet, and its 2-year flow is 347 cfs. The following parameters were determined based on Soar and Thorne criteria for a 347 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	21
Wave Length (L)	235
Pool-riffle Spacing	117
Radius of Curvature (Rc)	50
Range*	42-104
Amplitude (Amp)	38

* Absolute minimum – APWA maximum

Improvement Segment #1 of Project 29

Reach ID 3

Issues:

- Channel infrastructure degrading
- Lack of stream buffer between lawns and tributary



Project 29 – Segment 1

Windsor Box?

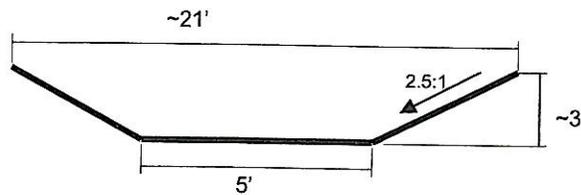
P17

Optimal Restoration:

- Add meandering pattern to channel
- Develop stable cross section
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel

Limited Restoration:

- Limited vegetation of banks
- Provide rip rap/bank protection of channel



Recommended Cross Section

Improvement Segment #2 of Project 29

Reach ID 5, 6

Issues:

- Observed instability and erosion on both banks



Project 29 – Segment 2

#35

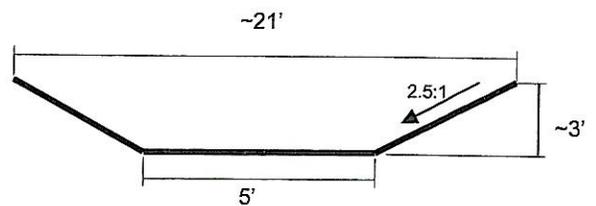
#6

Optimal Restoration:

- Add meandering pattern to channel
- Develop stable cross section
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel

Limited Restoration:

- Develop stable cross section
- Limited vegetation of banks
- Provide rip rap/bank protection of channel



Project 29 N SRP, Between Mission Rd & Windsor

Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$ 209,423; Priority 17
- Optimal Restoration with Land Acquisition = \$403,931
- Limited Restoration = \$ 146,937

Map C1 # 31 1-2

24. Improvement Project 26 - Rock Creek Meosha to Mission Rd -

#7

PRIORITY 19

The existing length of this reach (Reach ID 99, 100, 101, 102, 103, 104, 106, 107, 108, 109, 110, 111, 112, 113, 115) is 2622 feet, and its 2-year flow is 1854 cfs. The following parameters were determined based on Soar and Thorne criteria for a 1854 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	48
Wave Length (L)	543 - Meanders
Pool-riffle Spacing	272 - distance between - AVG
Radius of Curvature (Rc)	116
Range*	96-241 96 tight
Amplitude (Amp)	87 - how far out from straight line from tip to tip

deep section (pointing to Wave Length)
rocks (pointing to Radius of Curvature)
Energy dissipation (pointing to Pool-riffle Spacing)

* Absolute minimum - APWA maximum

Issues:

- Instability and erosion in key areas along project length as stream is naturally attempting to transition into a stable form.
- Lack of consistent stream buffer between creek and neighborhood lawns.



Project 26

Rock Creek -
Meosha Ln to Mission Rd

Optimal Restoration:

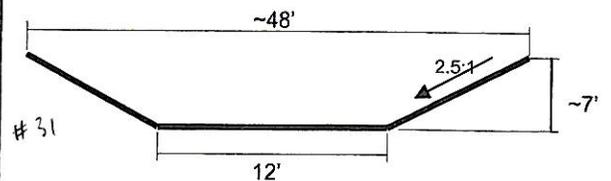
- Add meandering pattern to channel where applicable
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel where necessary

Limited Restoration:

- Limited vegetation of banks
- Provide rip rap/bank protection of channel



Project 26



Recommended Cross Section

Estimated Improvement Project Cost:

- Optimal Restoration = \$ 610,596; Priority 19
- Optimal Restoration with Land Acquisition = \$1,000,668
- Limited Restoration = \$ 511,405

Map C1 # 33? ^{1/4} Greenspace - Mission Bridge? #8
 33. Improvement Project 27 W-E Mission Bridge to State Park Rd to Mission Hills

PRIORITY 21

This project consists of two segments, divided by a tributary (Reach ID 34). The first segment (Reach ID 98) has an existing length of 183 feet, and its 2-year flow is 1854 cfs. The following parameters were determined based on Soar and Thorne criteria for a flow of 1854 cfs:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	48
Wave Length (L)	543
Pool-riffle Spacing	272
Radius of Curvature (Rc)	116
Range*	96-241
Amplitude (Amp)	87

* Absolute minimum - APWA maximum

The second segment (Reach ID 94, 95, 97) is 2746 feet, and its 2-year flow is 1999 cfs. The following parameters were determined based on Soar and Thorne criteria for a 1999 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	50
Wave Length (L)	564
Pool-riffle Spacing	282
Radius of Curvature (Rc)	120
Range*	100-250
Amplitude (Amp)	90

* Absolute minimum - APWA maximum

#33

WE
2/4

Paris House #8

Improvement Segment #1 of Project 27

This project consists of two segments, divided by a tributary (Reach ID 34). The first segment (Reach ID 98) has an existing length of 183 feet, and its 2-year flow is 1854 cfs. The following parameters were determined based on Soar and Thorne criteria for a flow of 1854 cfs:

Reach ID 98

Issues:

- Evidence of erosion and instability
- Lack of native vegetation and stream buffer



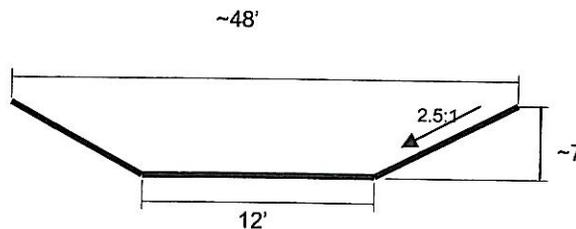
Project 27 – Segment 1

Optimal Restoration:

- Add meandering pattern to channel
- Develop stable cross section with natural slopes and benching
- Provide rip rap/bank protection of channel

Limited Restoration:

- Develop stable cross section with natural slopes and benching
- Provide rip rap/bank protection of channel



Recommended Cross Section

#33 W-E
3/4

#8

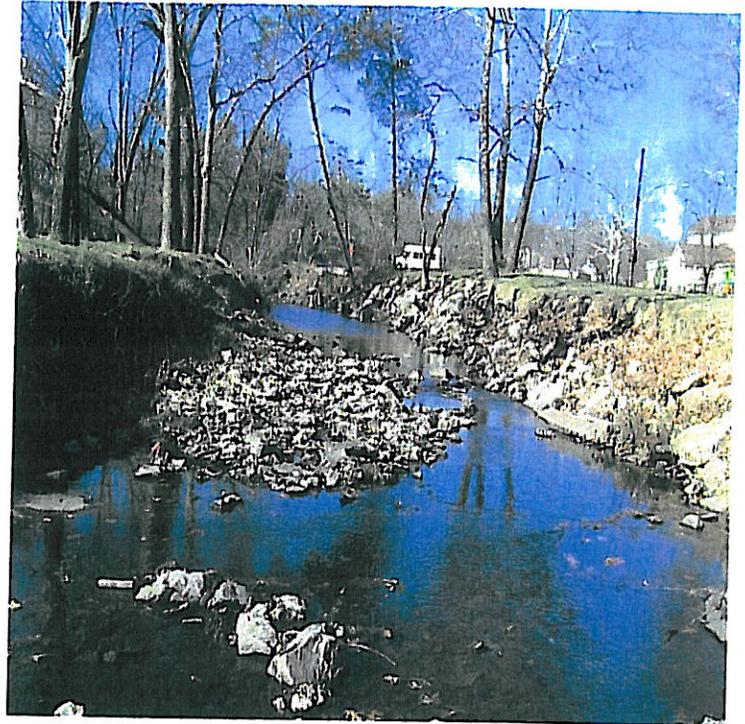
Improvement Segment #2 of Project 27

Issues:

- Some signs of instability and erosion on both banks
- Lack of stream buffer between lawns, parking lots and creek

Optimal Restoration:

- Add meandering pattern to channel
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel



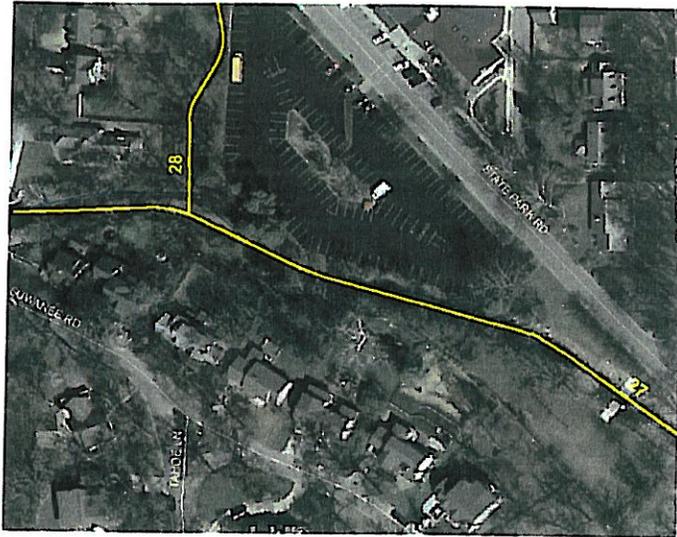
Project 27 – Segment 2

Limited Restoration:

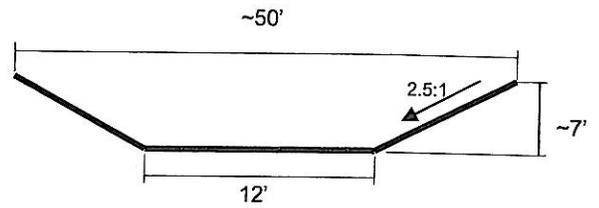
- Limited vegetation of banks
- Provide rip rap/bank protection of channel

#33 W-E
4/4

#8



Project 27



Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$ 1,170,783; Priority 21
- Optimal Restoration with Land Acquisition = \$1,280,339
- Limited Restoration = \$ 985,504

18. Improvement Project 33

PRIORITY 23

This project consists of two segments. The first segment (Reach ID 136) has an existing length of 164 feet, and its 2-year flow is 1581 cfs. The following parameters were determined based on Soar and Thorne criteria for a 1581 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	45
Wave Length (L)	501
Pool-riffle Spacing	251
Radius of Curvature (Rc)	107
Range*	89-223
Amplitude (Amp)	80

* Absolute minimum – APWA maximum

The second segment (Reach ID 126, 127, 128, 129, 130, 131, 132, 133, 134, 135) is 1018 feet, and its 2-year flow is 1700 cfs. The following parameters were determined based on Soar and Thorne criteria for a 1700 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	46
Wave Length (L)	520
Pool-riffle Spacing	260
Radius of Curvature (Rc)	111
Range*	92-231
Amplitude (Amp)	83

* Absolute minimum – APWA maximum

Improvement Segment #1 of Project 33
Reach ID 136

Issues:

- Limited infrastructure is degrading
- Some signs of erosion on both banks
- Concrete channels provide little habitat or water quality value, increase flow velocities and possibly contribute to downstream flooding concerns.



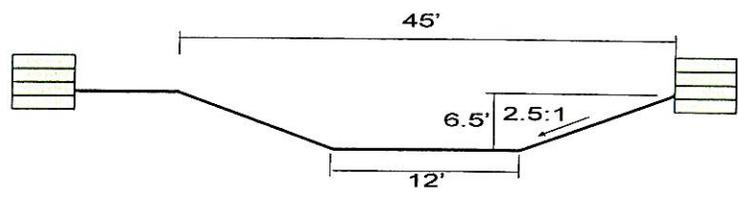
Project 33 – Segment 1

Optimal Restoration:

- Add meandering pattern to channel
- Replace left and right channel wall with sufficient width to develop low flow channel and flood benches.
- Provide rip rap/bank protection of channel

Limited Restoration:

- Replace left and right channel wall with sufficient width to develop low flow channel and flood benches.
- Provide rip rap/bank protection of channel



Recommended Cross Section

Improvement Segment #2 of Project 33

Reach ID 126-135

Issues:

- Some signs of instability and erosion on both banks
- Lack of community education of water quality and stream corridors.



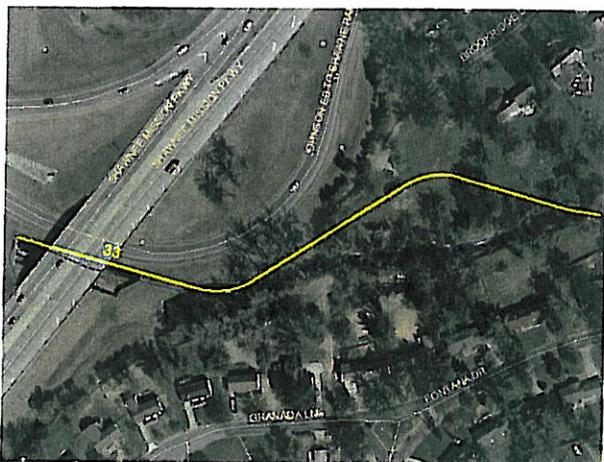
Project 33 – Segment 2

Optimal Restoration:

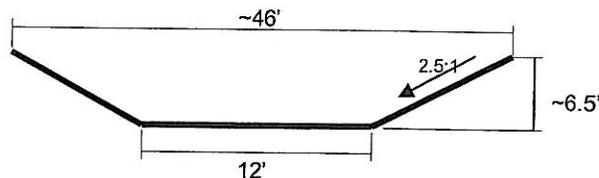
- Add meandering pattern to channel
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel

Limited Restoration:

- Develop stable cross section, providing bank protection
- Limited vegetation of banks



Project 33



Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$513,360; Priority 23
- Optimal Restoration with Land Acquisition = \$533,490
- Limited Restoration = \$440,950

Map C1 #337 1/2 MS State Park Rd to Mission Rd Bridge 10

28.Improvement Project 28

PRIORITY 25

The existing length of this reach (Reach ID 0, 1) is 271 feet, and its 2-year flow is 347 cfs. The following parameters were determined based on Soar and Thorne criteria for a 347 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	21
Wave Length (L)	235
Pool-riffle Spacing	117
Radius of Curvature (Rc)	50
Range*	42-104
Amplitude (Amp)	38

* Absolute minimum – APWA maximum

Issues:

- Some signs of instability and erosion on both banks
- Lack of native vegetation



Project 28 Mission Bridge - Greenspace

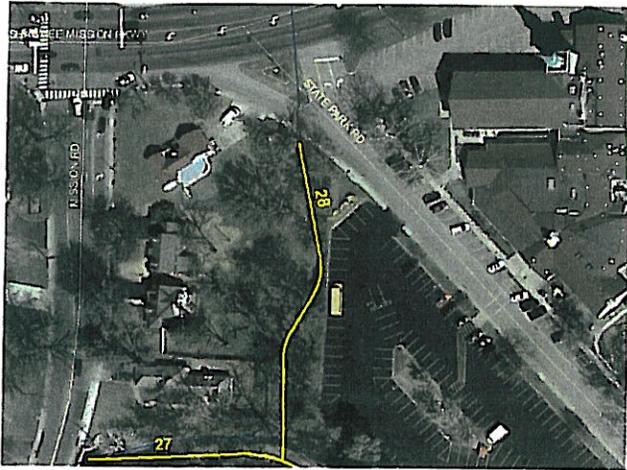
#33 N-S State Park Rd to McIlhenny Rd Bridge 10
2/2

Optimal Restoration:

- Add channel wall on left and right banks
- Incorporate vegetation and stable cross section
- Provide rip rap/bank protection of channel

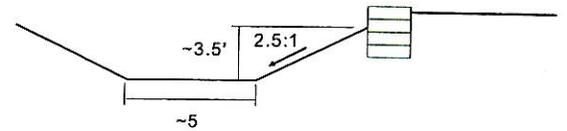
Limited Restoration:

- Add channel wall on left bank
- Limited vegetation of both banks
- Provide rip rap/bank protection of channel as necessary



Project 28

X Mission Bridge / Greenspace



Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$ 124,328; Priority 25
- Optimal Restoration with Land Acquisition = \$162,991
- Limited Restoration = \$ 109,000

Map C1 # 25 1-2

23. Improvement Project 22 S side of Brookledge

11

PRIORITY 31

The existing length of this reach (Reach ID 121, 120, 119, 118, 117, 116) is 1067 feet, and its 2-year flow is 1868 cfs. The following parameters were determined based on Soar and Thorne criteria for a 1868 cfs flow:

Recommended Channel Shape

Parameter	Value (ft)
Main Channel Width (w)	48
Wave Length (L)	545
Pool-riffle Spacing	273
Radius of Curvature (Rc)	116
Range*	97-242
Amplitude (Amp)	87

* Absolute minimum – APWA maximum

Issues:

- Significant erosion and instability on both banks



Project 22

2-2

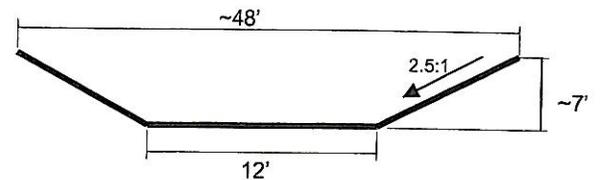
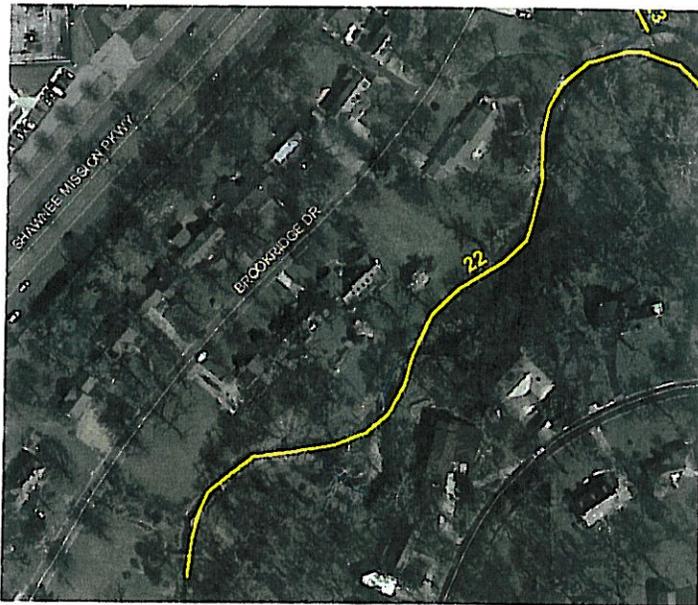
(1)

Optimal Restoration:

- Add meandering pattern to channel
- Integrate recommended stable cross section
- Vegetate banks and create buffer zone
- Provide rip rap/bank protection of channel

Limited Restoration:

- Integrate recommended stable cross section
- Limited vegetation of banks
- Provide rip rap/bank protection of channel as necessary



Project 22 S side of Brookridge Dr

Recommended Cross Section

Estimated Improvement Cost:

- Optimal Restoration = \$ 510,715; Priority 31
- Optimal Restoration with Land Acquisition = \$621,451
- Limited Restoration = \$ 445,145