

## Glossary of Terms

**BANKFULL DISCHARGE** - A flow condition where streamflow completely fills the stream channel up to the top of the bank. In undisturbed watersheds, the discharge condition occurs on average every one and a half to two years and controls the shape and form of natural channels.

**BASEFLOW** - The portion of streamflow that is not due to storm runoff, and is supported by groundwater seepage into a channel.

**BEDLOAD** - The sediment discharge transported by rolling, sliding or skipping of material along the bottom of the stream. In most streams the bedload generally consists of coarse sediment particles such as sand and gravel.

**BIOMASS** - The amount of living material present, generally expressed as a weight or volume. For this study, biomass refers to the relative number of individual macroinvertebrates and/or fish observed in the stream.

**CHANNELIZATION** - The modification, normally involving straightening, of a natural stream channel to improve its ability to move higher volumes of water more efficiently and in a non-erosive manner.

**DOWNCUTTING** - An erosive condition in which the bottom elevations of the streambed are lowered.

**EXTENDED DETENTION CONTROLS** - A stormwater management approach whereby runoff is captured and slowly released over a 6-40 hour period so as to: a.) enhance the gravitational settling/removal of urban pollutants and b.) reduce erosive stormflows within the receiving stream channel.

**FLOW SPLITTER** - An engineered, hydraulic structure designed to divert a portion of stream and/or stormflow to a BMP located out of the channel, or to direct stormwater to a parallel pipe system, or to bypass a portion of baseflow around a pond.

**FOULING** - The presence of a slime-like coating on the underside of rocks in a stream, which is generally indicative of excessive nutrient and organic carbon loads.

**GABION** - Stackable, rock-filled wire baskets generally used as an alternative to rip-rap for stabilizing stream channels.

**IMPERVIOUS AREA** - The portion of a watershed covered by hard surfaces, such as roads, parking lots, rooftops, etc..., where rainfall can no longer infiltrate into the underlying soil. Rain falling onto impervious surfaces is readily converted into surface runoff.

**MICROPOOL** - A small permanent wet pool surrounding the control structure of a stormwater management pond, generally employed as means of reducing maintenance problems associated with debris accumulation/clogging.

**NONPOINT SOURCE POLLUTION** - Water pollution emanating from a diffuse origin(s), such as stormwater or agricultural - related runoff.

**PARALLEL PIPE** - A structural technique used for protecting streams from excessive erosive flows. Excess stormwater runoff is piped in a parallel direction along side of the stream channel instead of being discharged directly into the stream.

**POINT BARS** - Coarse-grained material (e.g., sand, gravel, cobble) which is deposited on the inside portion of a meander by a stream. The presence of a large number of unstable/unvegetated point bars is generally indicative of highly erosive conditions within a stream.

**RETROFIT** - The creation/modification of stormwater management systems in developed areas through the construction of wet ponds, infiltration systems, wetland plantings, stream bank stabilization, and other BMP techniques for improving water quality and creating aquatic habitat. A retrofit can consist of the construction of a new BMP in the developed area, the enhancement of an older stormwater management structure, or a combination of improvement and new construction.

**RIFFLE EMBEDDEDNESS** - The amount of sand and silt (fines) surrounding the larger gravel, cobble, and/or rubble-sized material in the riffle portion of a stream. A high percentage of fine material is generally reflective of high sediment loading and suboptimal aquatic habitat conditions in the stream.

**RIPARIAN REFORESTATION** - The replanting of the banks and floodplain of a stream with native forest and shrub species to stabilize erodible soils, improve both surface and ground water quality, increase stream shading, and enhance wildlife habitat.

**SAND FILTER** - A relatively new technique for treating stormwater, whereby the first flush of runoff is diverted into a self-contained bed of sand. The runoff is then strained through the sand, collected in underground pipes and returned back to the stream or channel. An enhanced sand filter utilizes layers of peat, limestone, and/or topsoil, and may also have a grass cover crop. the adsorptive media of an enhanced sand filter is expected to improve removal rates.

**TEN-YEAR FREQUENCY STORM** - A rainfall event which occurs, on average, approximately every 10 years. In Montgomery County, MD. a ten-year storm event is associated with 5.2 inches of rainfall over a 24 hour period.

**TWO-YEAR FREQUENCY STORM** - A rainfall event which occurs, on average, approximately every two years. In Montgomery County, MD. a two-year storm event is associated with 3.2 inches of rainfall over a 24 hour period.

**VERNAL POOL** - A small, shallow temporary pool of water utilized by various amphibian species for breeding habitat. Vernal pools in this region typically hold water between October and June of each year.

**WATER QUALITY CONTROL** - The reduction of urban stormwater-borne pollutants via the employment of Best Management Practices (e.g., wet ponds, artificial wetlands, sand filters, infiltration systems, etc...), designed to capture and treat the first 0.5 - 1.0 inches of runoff (i.e., the first flush).

**WATER QUANTITY CONTROL** - The structural management of stormwater runoff produced by larger, less frequent rainfall events (generally 2-year frequency storms or larger), so as to reduce the likelihood of downstream channel erosion and/or flooding problems.

**WETTED PERIMETER** - The bottom portion of a stream channel covered by flowing water during baseflow conditions.



## References

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## Appendix A.

### Additional RSAT Evaluation Method Background Information

The Rapid Stream Assessment Technique (RSAT) includes the following three general steps:

**Step One** - Involves performing a field assessment of the physical, chemical and biological conditions present in the study stream. Over 30 parameters are measured at approximately 400 foot intervals. Typically, 12-13 riffle - specific transects are employed for each stream mile surveyed. Data is first recorded via field survey sheets and later entered into a Lotus 1-2-3 spreadsheet data base. The RSAT step one method evaluates the condition of the following six major stream categories: 1.) bank stability, 2.) channel scouring/sediment deposition, 3.) physical in-stream habitat (i.e., quality of riffle and pool habitat), 4.) water quality, 5.) riparian habitat and 6.) stream biota (macroinvertebrates). A background description of the rating system used for evaluating, these six categories, as well as, an example of a completed RSAT field survey form is included. Based on a 0-50 point scoring system stream quality conditions are verbally rated as follows:

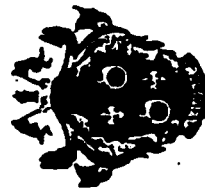
Total Points Scored	Verbal Ranking
42 - 50	Excellent
30-41	Good
16-29	Fair
< 16	Poor

Note, all of the streams surveyed in this study fell into the fair range, indicating moderate levels of impairment/degradation.

**Step Two** - The Step Two 'General Remedial Measures Guide' was developed as a planning - level screening tool for providing assistance to non-aquatic biologists in identifying appropriate generic - type solutions for observed stream problems. The Guide factors both stream size (i.e., its baseflow in cubic feet per second) and stream/riparian corridor problem-level into a restoration matrix (example provided). To use the Guide one must first determine both the stream size and the existing problem level for the general restoration objective subcategory. For example, if the subject stream has a baseflow of 0.6 cfs and the existing riffle and pool habitat is severely degraded, physical in-stream habitat restoration efforts would be deemed appropriate. Conversely, if riffle and pool habitat were only slightly degraded then major habitat enhancement/restoration efforts would be considered inappropriate.

**Appendix A. RSAT Evaluation Method**

<b>RSAT Evaluation Method - Step One</b>					
<b>Evaluation Category</b>	<b>Relative Significance</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
<b>1. Channel Stability</b>	<ul style="list-style-type: none"> <li>Indicative of hydrologic/flow regime alteration and general condition of physical aquatic habitat.</li> <li>Provides insight into past, present and future changes in channel morphology.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; 80% of bank network stable;</li> <li>stream bend areas are very stable. outerbank height &lt; 2 ft. above stream. bank overhang &lt; 2ft;</li> <li>exposed tree roots - old, large, and woody. generally 0-1 recent (large) tree falls/stream mile;</li> <li>bottom 1/3 of bank is generally highly resistant material;</li> <li>channel x-sect. is generally v-shaped.</li> </ul>	<ul style="list-style-type: none"> <li>71-80% of bank network stable;</li> <li>stream bend areas stable. outer bank height 2-3 ft. above stream. bank overhang 2-25 ft.;</li> <li>exposed tree roots predominantly old and large, smaller young roots scarce. 2-3 recent (large) tree falls/stream mile;</li> <li>bottom 1/3 of bank is generally highly resistant material;</li> <li>channel x-sect. is generally v-shaped.</li> </ul>	<ul style="list-style-type: none"> <li>50 - 70% of bank network stable;</li> <li>stream bend areas unstable. outer bank height 3-4 ft. above stream. bank overhang 2.5 - 3.0 ft.;</li> <li>young exposed tree roots common. 4-5 recent (large) tree falls/stream mile;</li> <li>bottom 1/3 of bank is highly erodible material;</li> <li>channel x-sect. is generally trapezoidally-shaped.</li> </ul>	<ul style="list-style-type: none"> <li>&lt; 50% of bank network stable;</li> <li>stream bend areas highly unstable. outer bank height &gt; 4 ft. above stream. overhang &gt; 3 ft.;</li> <li>young exposed tree roots abundant. ≥ 6 recent large tree falls/stream mile;</li> <li>bottom 1/3 of bank is highly erodible material;</li> <li>channel x-sect. is generally trapezoidally-shaped.</li> </ul>
	<b>Point Range</b>	<b>9-11</b>	<b>6-8</b>	<b>3-5</b>	<b>0-2</b>



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Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
2. Channel Scouring/ Sediment Deposition	<ul style="list-style-type: none"> <li>Relates to level of uncontrolled stormwater runoff, sediment load and transport, and degradation of instream habitat.</li> </ul>	<ul style="list-style-type: none"> <li>rifle embeddness &lt; 25% sand/silt;</li> <li>high number of deep pools <math>\geq</math> 24". pool substrate &lt; 30% composed of sand/silt;</li> <li>streambed streak marks or nick points absent;</li> <li>fresh, large sand deposits in channel rare-absent. no evidence of fresh sediment deposition on overbank;</li> <li>point bars small and stable, well vegetated and/or armored with little no fresh sand.</li> </ul>	<ul style="list-style-type: none"> <li>25-50% embedded;</li> <li>moderate number of deep pools. pool substrate 30 - 59% sand/silt;</li> <li>streaks or nick points uncommon;</li> <li>fresh, large sand deposits in channel uncommon. small localized areas of fresh sand deposits along top of low banks;</li> <li>point bars small and stable, well vegetated and/or armored with little no fresh sand.</li> </ul>	<ul style="list-style-type: none"> <li>50-75% embedded;</li> <li>low-moderate number of deep pools. pool substrate 60-80% sand/silt;</li> <li>streaks or nick points common;</li> <li>fresh, large sand deposits in channel common. small localized areas of fresh sand deposits along top of low banks;</li> <li>point bars moderate-large and unstable with high amount of fresh sand.</li> </ul>	<ul style="list-style-type: none"> <li>&gt;75% embedded;</li> <li>few, if any, deep pools. pool substrate &gt; 81% sand/silt;</li> <li>streaks or nick points very common;</li> <li>fresh, large sand deposits v. common in channel. moderate-heavy sand deposition along major portion of overbank area v. common;</li> <li>point bars moderate-large and unstable with high amount of fresh sand.</li> </ul>
	Point Range	7-8	5-6	3-4	0-2

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
<p>3. Physical In-Stream Habitat</p> <ul style="list-style-type: none"> <li>Relates to the ability of a stream to meet basic physical requirements necessary for the support of a well-balanced aquatic community (e.g. - depth of flow, water velocity, water temperature, substrate type and quality, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>wetted perimeter &gt; 85% of bottom channel width;</li> <li>riffles, runs, and pool habitat present, diverse velocity and depth of flow present (i.e., slow, fast, shallow and deep water);</li> </ul> <p>* riffle/pool ratio 0.9-1.1:1</p> <ul style="list-style-type: none"> <li>larger pools generally &gt; 24 in. deep with some overhead cover/structure;</li> <li>riffle substrate composition - cobble, gravel, rubble, boulder mix with little sand.</li> </ul> <p>( &gt; 50% large cobble/rubble);</p>	<ul style="list-style-type: none"> <li>wetted perimeter 61- 85% of bottom width;</li> <li>good mix between riffles, runs and pools, relatively diverse velocity/ depth of flow;</li> </ul> <p>* riffle/pool ratio 0.7 -0.9:1 ; 1.1-1.3:1</p> <ul style="list-style-type: none"> <li>larger pools generally 18-24 in. deep with some cover/structure;</li> <li>riffle substrate has good mix of gravel cobble and rubble material.</li> </ul> <p>(30-50% large cobble/rubble);</p>	<ul style="list-style-type: none"> <li>wetted perimeter 40-60% of bottom width;</li> <li>few pools present, riffles and runs dominant, velocity/ depth generally slow-shallow;</li> </ul> <p>* riffle/pool ratio - 0.5-0.6:1 ; 1.31- 1.5:1</p> <ul style="list-style-type: none"> <li>larger pools generally 12-18 in. deep with little or no cover/ structure;</li> <li>riffle/substrate composition predominantly smaller material with high percentage of sand.</li> </ul> <p>(10-30% large cobble/rubble);</p>	<ul style="list-style-type: none"> <li>wetted perimeter &lt; 40% of bottom width;</li> <li>dominated by one habitat type (usually runs) and by one velocity/depth condition (slow-shallow);</li> </ul> <p>* riffle/pool ratio 0.4:1 ≤ ; ≥ 1.5:1</p> <ul style="list-style-type: none"> <li>larger pools generally &lt; 12 in. deep and devoid of cover/structure;</li> <li>riffle substrate - predominantly small cobble, gravel, sand and silt.</li> </ul> <p>( &lt; 10% large cobble/rubble);</p>	

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
3. Physical In-Stream Habitat (Continued)	Point Range	<ul style="list-style-type: none"> <li>no channel alteration or significant point bar formation or enlargement;</li> <li>* summer temp <math>\leq 68^{\circ}\text{F}</math>.</li> </ul> <p>7-8</p>	<ul style="list-style-type: none"> <li>slight increase in point bar formation/enlargement or slight amount of channel modification;</li> <li>* <math>\text{H}_2\text{O}</math> temp <math>68-75^{\circ}\text{F}</math>.</li> </ul> <p>5-6</p>	<ul style="list-style-type: none"> <li>moderate increase in point bars and/or in amount of channel modification;</li> <li>* <math>\text{H}_2\text{O}</math> temp <math>75-80^{\circ}\text{F}</math>.</li> </ul> <p>3-4</p>	<ul style="list-style-type: none"> <li>extensive channel alteration or point bar formation/enlargement;</li> <li>* <math>\text{H}_2\text{O}</math> temp <math>&gt;80^{\circ}\text{F}</math>.</li> </ul> <p>0-2</p>
4. Water Quality	<ul style="list-style-type: none"> <li>Indicative of: water-shed perturbations/general level of human activity, point and nonpoint source loads, and aquatic habitat conditions.</li> </ul> <p>Point Range</p>	<ul style="list-style-type: none"> <li>clear water - objects &gt; 3 ft. deep visible;</li> <li>no odor;</li> <li>TDS &lt; 50 mg/L;</li> <li>substrate fouling level 0-10% (rock underside).</li> </ul> <p>7-8</p>	<ul style="list-style-type: none"> <li>objects visible down 1.5 - 3.0 ft.;</li> <li>slight organic odor;</li> <li>TDS - 50-100 mg/L;</li> <li>substrate fouling level - v. light-light (11- 20%).</li> </ul> <p>5-6</p>	<ul style="list-style-type: none"> <li>objects visible down 0.5 - 1.5 ft.;</li> <li>slight-moderate odor;</li> <li>TDS - 101-150 mg/L;</li> <li>substrate fouling level - moderate (21-50%).</li> </ul> <p>3-4</p>	<ul style="list-style-type: none"> <li>objects visible to depth &lt; 0.5 ft.;</li> <li>moderate-strong organic odor;</li> <li>TDS &gt; 150 mg/L;</li> <li>substrate fouling level - high (&gt; 50%).</li> </ul> <p>0-2</p>

Evaluation Category	Relative Significance	Excellent	Good	Fair	Poor
5. Riparian Habitat Conditions	<ul style="list-style-type: none"> <li>Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions.</li> </ul> <p>Point Range</p>	<ul style="list-style-type: none"> <li>wide (&gt;200') mature forested buffer along both banks;</li> <li>canopy coverage: <math>\geq 80\%</math> shading.</li> </ul> <p>6-7</p>	<ul style="list-style-type: none"> <li>forested buffer generally more than 100 ft. wide along major portion of both banks;</li> <li>canopy coverage: 60-79% shading.</li> </ul> <p>4-5</p>	<ul style="list-style-type: none"> <li>riparian area predominantly wooded but with major localized gaps;</li> <li>canopy coverage: 50-60% shading.</li> </ul> <p>2-3</p>	<ul style="list-style-type: none"> <li>riparian area mostly non-woody vegetation, narrow-width riparian area;</li> <li>canopy coverage: &lt; 50% shading.</li> </ul> <p>0-1</p>
6. Biological Indicators	<ul style="list-style-type: none"> <li>Best overall indication of stream health and level of watershed perturbation.</li> </ul> <p>Point Range</p>	<ul style="list-style-type: none"> <li>diverse macro-invertebrate community present, dominated by flat head mayflies, stone flies and cased caddisflies, very few snails, and/or leeches present;</li> <li>moderate-high number individuals.</li> </ul> <p>7-8</p>	<ul style="list-style-type: none"> <li>mayflies and caddisflies present (stoneflies absent); good overall diversity;</li> <li>moderate-high number individuals.</li> </ul> <p>5-6</p>	<ul style="list-style-type: none"> <li>pollution-tolerant caddisflies, snails, midgeflies, aquatic worms dominant;</li> <li>low-moderate number individuals.</li> </ul> <p>3-4</p>	<ul style="list-style-type: none"> <li>poor diversity generally dominated by midgeflies, aquatic worms and snails;</li> <li>depauperate population - low number individuals.</li> </ul> <p>0-2</p>

RSAT Total Points  
 42-50 = Excellent  
 30-41 = Good  
 16-29 = Fair  
 > -16 = Poor

TOTAL SCORE \_\_\_\_\_

Montgomery County Stream Survey Study

13-12-11-6-7

Example - RSAT Field Survey Form

Watershed Cabin John Creek MC Street Map Book Coordinates MC31 K1 & K2  
 Tributary Name and Number Dawson Farm Creek (Upper Section)  
 D.A. (ac) 396.4 Watershed Imperviousness (%) 45  
 Stream Gradient (%) 1.3% MDE Class I  
 Date 6/2/93 Time 0900 Investigators J. Galli & P. Trieu  
 Current Weather Conditions Sunny & Cool  
 Last Precipitation Event 5/31/93  
 Survey Reach Fleet St. to Woolton Pkwy - Tower Oaks (to end of gabion-lined channel)  
 Survey Length (ft.) 5050ft Riffle/Pool Ratio (42/35) 1.2:1  
 Baseflow (cfs) 0.88 cfs @ X-12 General Accessibility Excellent  
 Photo No.s 10 (R&P), 11 (X-3), 12 (Dawson Farm), 13 (X-5), 14, 15, 16, 17, 18, 19, 20 & 21 (24' @ 20'), 22  
 W. Edmonston Culvert (X-12)

Avg. Canopy Coverage (%) 57.5 (30, 90, 95, 0, 70, 90, 20, 50, 95, 90, 95, 0, 0, 0)  
 Total No. of Tree Falls - 1  
 No. of Recent Tree Falls - 1  
 Relative Amount of Trash Present - Moderate-heavy upstream of W. Edmonston Dr.; light-downstream  
 No. of Observed Fish Barriers - 1  
 Partial - 1  
 Complete - 0  
 No. of Exposed Sewerlines - 0

Reach No.	Reach Length (ft)	Top Channel Width (ft)	Bottom Channel Width (ft)	Wetted Perimeter (ft)	Avg. Riffle Depth (ft)	Avg. Bank Height (ft)			Bank Stability (%)			Bank Material Type		Riffle Substrate Material Composition	Embeddedness (%)	Substrate Fouling Level (%)	Riparian Vegetation (Type)		Buffer Width (ft)		Pool Habitat	
						R	L	Avg.	R	L	Avg.	R	L				R	L	Max. Depth (ft)	Occ. Sp.		
1	50	10.0	7.0	4.0	3.4	3.0	1.5	95	75	95	Sap	S/G	B, R, C, B, S	15	45	G/F	G/F	20	30	17	Fai	
2	50	16.0	6.0	3.5	2.4	3.0	2.0	20	95	50	L	S/S	G, C, R, S, B	100	60	F	F	15	50	23	Exc	
3	50	17.0	6.5	6.0	2.0	8.0	2.5	70	90	90	S/L	S/S	C, S, B, R	60	50	G/F	G	20	200	14	Good	
4	50	14.0	5.0	3.5	1.9	3.0	3.0	95	90	95	S/L	S/S	B, G, C, R, B, S	30	35	F	G/F	20	30	None	-	
5	50	11.0	8.0	7.0	2.2	3.0	2.5	50	70	60	S/L	S	G, C, R, S	95	40	F	F	15	15	17	Fai	
6	50	15.0	8.0	5.0	2.6	4.0	5.5	80	50	65	S/L	S/L	G, C, R, B, S	45	50	S/F	G/F	15	15	26	Exc	
7	50	15.0	10.0	7.0	2.0	4.5	3.0	90	90	90	S/S	L/C	G, B, R, S, C	95	45	F	S/F	15	15	None	-	
8	50	29.0	13.0	9.0	2.3	4.0	3.0	80	70	75	S/L	S/S	B, G, R, S, C	45	55	F	F	100	175	23	V. G	
9	50	18.0	11.0	7.5	2.8	3.5	3.5	70	85	78	C/L	S/S	B, R, G, C, S	65	50	F	F	100	200	None	-	
10	50	27.0	21.5	12.0	1.5	4.0	3.0	60	70	65	S/L	S/S	R, C, B, S	45	40	F	F	80	200	20	Good	
11 *	50	42.0	14.0	4.0	3.6	7.0	5.0	100	100	100	Gab	Gab	S, B, R, B, S, S	90	60	G	G/F	50	200	None	-	
12 *	50	37.0	13.0	6.5	4.1	8.0	7.0	100	100	100	Gab	Gab	B, R, C, G	80	20	G	G/F	15	200	None	-	
13																						
14																						
15																						
AVG.		20.9	10.3	6.3 (61%)						80.8				63.8	45.8							

Key Abbreviations: C = clay, SL = silt, S = sand, G = gravel, Ch = cobble, R = rubble, B = boulder, F = forest, Gr = grass, \* = highly erodible bank material present.  
 A = abundant, C = common, SCA = scarce, Ra = rare, Bd = Bed Rock, Sap = Saprotic, Conc = Concrete, Gab = Gabion  
 Sh = Shrub

\* = gabion-lined channel along Woolton Pkwy

**WATER QUALITY CONDITIONS**

Transect No.	Time (hr)	Temp (°C)		DO (mg/L)	pH	TDS (mg/L)	Cond (ms/cm)	Turb (NTU)	Water Color	Odor
		air	water							
1	0935	18.5	15.2	6.84	6.87	160	0.477	4.0	Clear	Strong organic (algae)
5	1205	19.5	15.6	8.94	7.35	140	0.416	6.0	Clear	None

Miscellaneous Conditions 1.) Strong algal odor noted downstream of Fleet st. 2.) Intermittent, moderately strong sewage odor detected in the vicinity of x-9 (Note, no sewage fungus or sewage flow observed in the stream). 3.) Turbidity problem throughout (gabion line channel above Wootton Pkwy).

**Biological Conditions:**

Observed:

- \*Eggs & larvae
- Roundhead mayfly (Baetis sp.) @ x-6
- Fish Flies (adult) x-10, x-11, x-12

Representative Taxa

Stoneflies	Mayflies	Caddisflies	Holopterygids	Crickets	Water Beetles	Water Bugs	Water Penny	Dragonflies	Damselflies	Beetles	Amphipods	Isopods	Leeches	Segmented Worms	Snails	Clayfish	Amphipods	Tricopa	Tricopa	Black Flies	Water Slugs	R. Nose Dace	Creek Chub	Hydroids	Plant-like Algae	Swamp Fish	Bladder
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

- observed:
- northern 2-lined Salamander
  - water snake (Siphon natrix)

Miscellaneous Conditions 1.) No fish observed upstream of x-3 (no fish barriers observed; habitat adequate) 2.) W. Edmonson Dr. culvert appears to be a partial fish barrier and Wootton Pkwy culvert is a complete fish barrier due to extensive length w/shallow laminar flow. 3.) Macroinverteb. diversity & biomass generally increased in a downstream direction; however both were in the low-moderate range. 4.) Structural Channel Modification/Storm Drain Outfalls: habitat in recently constructed gabion channel is poor - lacks pools. 5.) Only Blacknose dace observed

Channel Modification R \_\_\_ ft Gabions 60' Rip-Rap 955' Other \_\_\_  
L \_\_\_ ft 60' 955'

Storm Drain Outfall(s) 42" RCP, 15" RCP, 80" RCP, 24" RCP, 24" RCP, 21" RCP, 21" RCP, 36" RCP (TDS 110mg/L)  
21" RCP, 18" RCP (TDS 90mg/L), 24" RCP, 27" RCP, 24" RCP

**RSAT Stream Evaluation Summary - Step One**

Category	Excellent	Good	Fair	Poor	Score
1. Bank Stability	9-11	6-8	3-5	0-2	5
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	4
3. Physical In-Stream Habitat	7-8	5-6	3-4	0-2	4
4. Water Quality	7-8	5-6	3-4	0-2	5
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-1	3
6. Biological Indicators	7-8	5-6	3-4	0-2	7

Total Points  
42-50 = Excellent  
30-41 = Good  
16-29 = Fair  
< 16 = Poor

VERSAL RANKING Fair

TOTAL SCORE: 23

## STEP TWO. General Remedial Measures Guide<sup>1/</sup>

Restoration Objective(s)		Stream/Riparian Corridor Problem Level								
		Slight	Moderate	Severe	Slight	Moderate	Severe	Slight	Moderate	Severe
<b>I. Bank Stabilization/Aquatic Habitat Restoration</b>										
	Major Stream Bank Stabilization	○	⊗	●	○	⊗	●	○	⊗	●
	Baselw Channel Restoration	○	⊗	⊗	○	⊗	●	○	⊗	●
	Pool/Riffle Sequence Restoration	○	⊗	⊗	○	⊗	●	○	⊗	●
	Overhead Cover/Other	○	○	○	⊗	⊗	⊗	⊗	⊗	⊗
<b>II. Fisheries Restoration/Management</b>										
	Forage Fish (non-sensitive)	⊗	●	●	⊗	●	●	⊗	●	●
	Resident Game and/or Sensitive Fish	○	○	○	⊗	⊗	⊗	⊗	⊗	⊗
	Put and Take	○	○	○	⊗	⊗	⊗	⊗	⊗	⊗
<b>III. Riparian Restoration</b>										
	Canopy Coverage	⊗	⊗	●	⊗	⊗	●	⊗	⊗	⊗
	Wetlands	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
	Wildlife	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
	Native Plant Communities	⊗	⊗	●	⊗	⊗	●	⊗	⊗	●
<b>IV. Aesthetic</b>										
	Trash Reduction/Removal	●	●	●	●	●	●	●	●	●
	Landscape	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
Stream Size <sup>2/</sup> (cfs)	0.01 - 0.5 cfs									
	0.51 - 5.0cfs									
	> 5.0cfs									

### LEGEND

● Appropriate    ⊗ Case - by - Case    ○ Not Appropriate

1/ Consultation with appropriate resource management experts recommended prior to concept restoration plan development.

2/ Stream size = normal baselw discharge in cubic feet/second (cfs).

**Step Three** - The Step Three 'Project Prioritization' method is employed for systematically prioritizing stream channel stabilization and/or stormwater management retrofit project needs for the Step One survey reach. Five general evaluation factors are employed under the Step Three system. These factors are: 1.) overall site accessibility, 2.) proximity of moderate/severe and/or severe channel erosion areas to nearby residences/buildings, 3.) environmental site sensitivity/expected tree removal, 4.) level of existing or programmed upstream SWM controls within the subwatershed and 5.) the relative stream problem level, taking stream size into account. An example completed form for the Step Three evaluation (upper portion of Dawson Farm Creek) is included. As seen in the example form, the Upper Dawson Farm Creek received a total score of 29, placing it into a moderate (level II) project priority level.

RSAT Project Prioritization

Step Three		Project Prioritization " Dawson Farm Creek (Upper Section)			
Evaluation Factor		Ranking Category			
		Low	Moderate	High	Points
1.	Overall Site Accessibility	0-3 (Poor)	4-6 (Fair-Good)	7-9 (V.Good - Excellent)	7
2.	Proximity of Moderate-Severe/Severe Channel Erosion Area to Nearby Residences/Buildings				
	Ca.L. No. of Residences				Points
	A. 0				0
	B. 1-2				7,4,1
	C. 3-5				8,5,2
	D. ≥6				9,6,3
	Distance (ft)				
	<50,50-100,>100				
	<50,50-100,>100				
	<50,50-100,>100				
	<50,50-100,>100				
3.	Environmental Sensitivity/Tree Removal	7-9	4-6	0-3	
	Ca.L. Predominant Condition				Points
	A. Mature Forest and/or Wetland				3,2,1/0
	B. Young Forest				6,5,4
	C. Mixed and/or Other				9,8,7
	Est. Disturbance				
	Low, Mod., High				
	Low, Mod., High				
	Low, Mod., High				
4.	Level of Existing or Programmed SWM Control(s) Within Watershed	7-9	4-6	0-3	7
5.	Stream Problem Level <sup>2/</sup>	7-9	4-6	0-3	7
	Ca.L. Baseflow(cfs)				
	A. 0-0.5				(Points)
	B. 0.51-1.0				1,4,7
	C. >1.1				2,5,8
	D. All				3,6,9
	Severe Erosion (LFE)				0
	50-200,201-900,>900				
	50-200,201-900,>900				
	50-200,201-900,>900				
	<50				

Total Score 39  
 Priority Level II (mod)

Total Points  
 ≥ 30  
 20-29  
 ≤ 19

Project Priority Level  
 High (Level I)  
 Moderate (Level II)  
 Low (Level III)

1/ Only performed if Step One total score ≤ 29 or Step One category one score is ≤ 5.  
 2/ Note, point scores may be modified, by 1-5 points, to reflect poor water quality and/or problem conditions.



**Appendix B.**

**Summary: RSAT Step One Stream Survey Findings**

**Elwood Smith Tributary**

Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	5
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	4
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	4
4. Water Quality	7-8	5-6	3-4	0-2	2
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	3
6. Biological Indicators	7-8	5-6	3-4	0-2	4

VERBAL RANKING Fair TOTAL SCORE 22

**Upper - Middle Cabin John Creek**

Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	3
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	3
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	4
4. Water Quality	7-8	5-6	3-4	0-2	4
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	3
6. Biological Indicators	7-8	5-6	3-4	0-2	5

VERBAL RANKING Fair TOTAL SCORE 22

**Dogwood Park Tributary**

Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	3
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	2
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	3
4. Water Quality	7-8	5-6	3-4	0-2	5
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	5
6. Biological Indicators	7-8	5-6	3-4	0-2	2

VERBAL RANKING Fair TOTAL SCORE 20

Total Points  
 42-50 = Excellent  
 30-41 = Good  
 16-29 = Fair  
 <16 = Poor

**Dawson Farm Creek (Upper)**

Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	5
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	4
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	4
4. Water Quality	7-8	5-6	3-4	0-2	3
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	3
6. Biological Indicators	7-8	5-6	3-4	0-2	4

VERBAL RANKING Fair TOTAL SCORE 23

**Dawson Farm Creek (Lower)**

Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	3
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	3
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	4
4. Water Quality	7-8	5-6	3-4	0-2	3
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	5
6. Biological Indicators	7-8	5-6	3-4	0-2	4

VERBAL RANKING Fair TOTAL SCORE 22

**Woodmont Country Club Tributary No. 1**

Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	4
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	2
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	3
4. Water Quality	7-8	5-6	3-4	0-2	5
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	5
6. Biological Indicators	7-8	5-6	3-4	0-2	5

VERBAL RANKING Fair TOTAL SCORE 24

Total Points  
 42-50 = Excellent  
 30-41 = Good  
 16-29 = Fair  
 <16 = Poor

**Seven Locks Tributary**

Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	7
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	3
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	5
4. Water Quality	7-8	5-6	3-4	0-2	5
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	4
6. Biological Indicators	7-8	5-6	3-4	0-2	4

VERBAL RANKING Fair TOTAL SCORE 28

**Lower Cabin John Creek**

Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	4
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	3
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	3
4. Water Quality	7-8	5-6	3-4	0-2	3
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	4
6. Biological Indicators	7-8	5-6	3-4	0-2	4

VERBAL RANKING Fair TOTAL SCORE 21

**Bogley Branch**

Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	3
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	3
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	3
4. Water Quality	7-8	5-6	3-4	0-2	6
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	4
6. Biological Indicators	7-8	5-6	3-4	0-2	4

VERBAL RANKING Fair TOTAL SCORE 23

Total Points  
 42-50 = Excellent  
 30-41 = Good  
 16-29 = Fair  
 <16 = Poor

**Old Farm Creek**

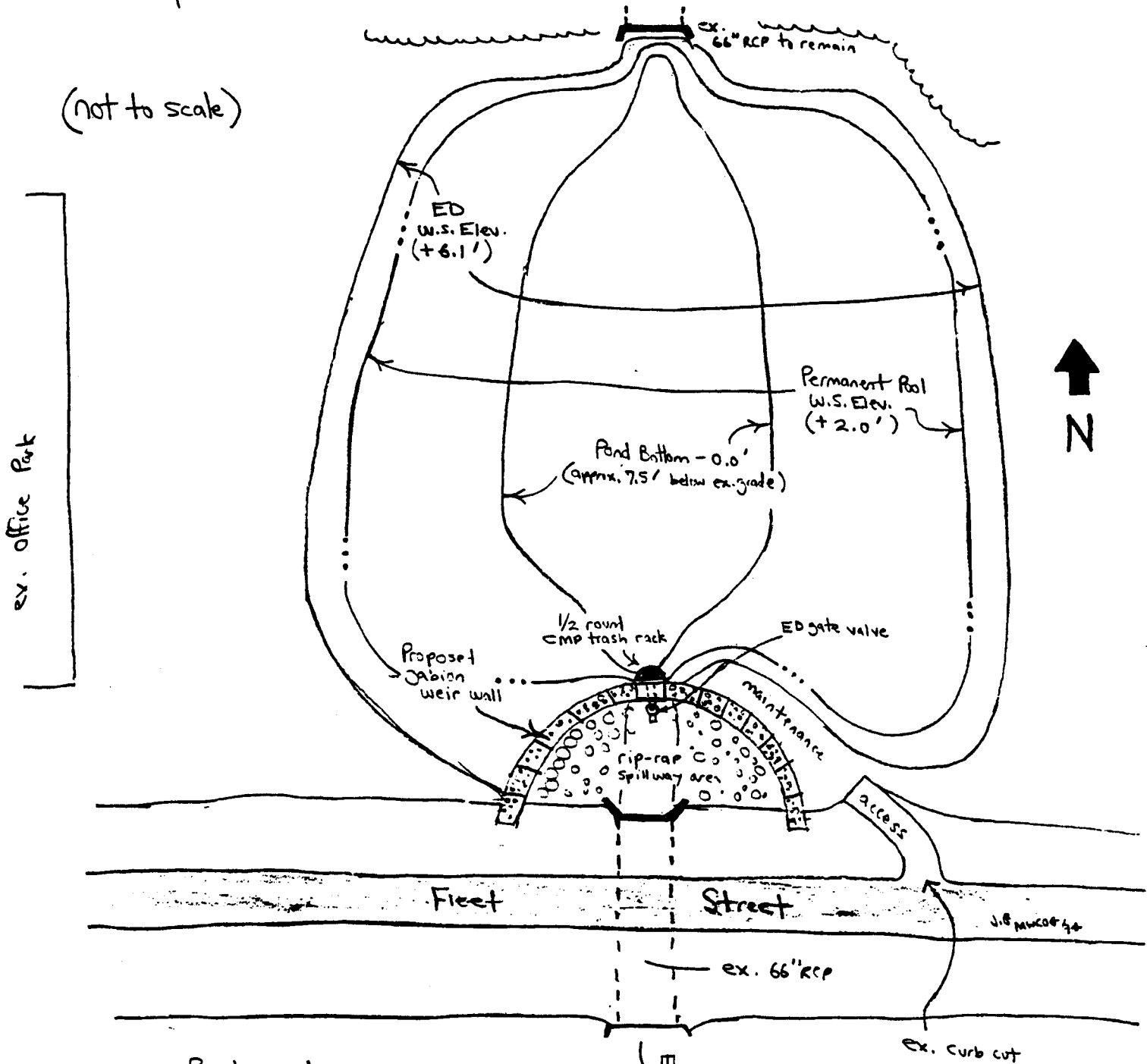
Category	Excellent	Good	Fair	Poor	Points
1. Bank Stability	9-11	6-8	3-5	0-2	4
2. Channel Scouring/Deposition	7-8	5-6	3-4	0-2	2
3. Physical In - Stream Habitat	7-8	5-6	3-4	0-2	4
4. Water Quality	7-8	5-6	3-4	0-2	3
5. Riparian Habitat Conditions	6-7	4-5	2-3	0-2	5
6. Biological Indicators	7-8	5-6	3-4	0-2	3

VERBAL RANKING Fair

TOTAL SCORE 21

Total Points  
 42-50 = Excellent  
 30-41 = Good  
 16-29 = Fair  
 <16 = Poor

# Proposed Fleet Street - ED Marsh Retrofit\*



## Background:

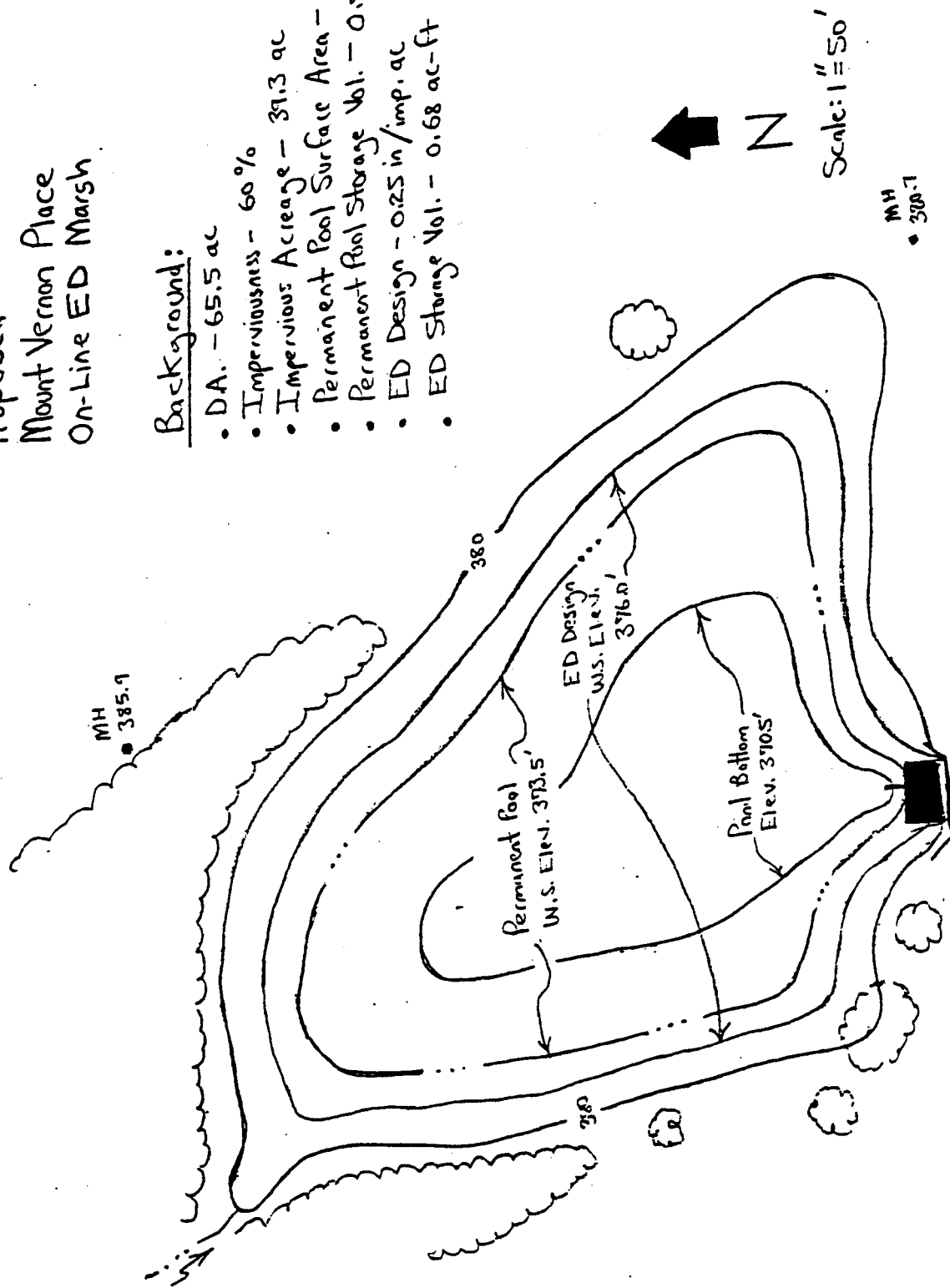
- D.A. - 28.0 ac
- Imperviousness - 80.0%
- Impervious Acreage - 22.4 ac
- Permanent Pool Surface Area - 0.51 ac
- Permanent Pool Storage Vol. - 0.77 ac-ft
- ED Design - 1.1 in/imp ac
- ED Storage Vol. - 2.05 ac-ft

\* Note, retrofit concept involves unearthing and removing approx. 200 LF of ex. 66" RCP storm drain.

Proposed  
Mount Vernon Place  
On-Line ED Marsh

Background:

- D.A. - 65.5 ac
- Imperviousness - 60%
- Impervious Acreage - 39.3 ac
- Permanent Pool Surface Area - 0.35 ac
- Permanent Pool Storage Vol. - 0.70 ac-ft
- ED Design - 0.25 in/imp. ac
- ED Storage Vol. - 0.68 ac-ft



MOUNT VERNON PL.



# Proposed Elwood Smith Park On-Line ED Dry Pond\*

SUM SITE: ELWOOD SMITH PARK (acting independently) DATE: 2/08  
 LOCATION: Elwood Smith Park - Cabin John Branch  
 POND DATA:

- Drainage Area : 104.6 AC. - Subexisting CI-CN
- Structure Height : 12.6 Ft.
- Embayment Length : 266 Ft.
- Storms Below dam : 21.5 AC-ft.
- Freeboard (375.6)

**OUTLET WORKS:**

- 80" RCP Low Flow Orifice - Invert Elevation - 364.0 Ft.
- 60" RCP Barrel - Inlet Invert Elevation - 364.0 Ft.
- 82' Grated Spillway - Crest Elevation - 372.0 Ft.

**POOL ELEVATIONS AND FLOOD STORAGE (ultimate conditions):**

ELEVATION	STORAGE
Normal Pool	N/A
10-Year Storm	15.1 AC-Ft.
100-Year Storm	10.9 AC-Ft.

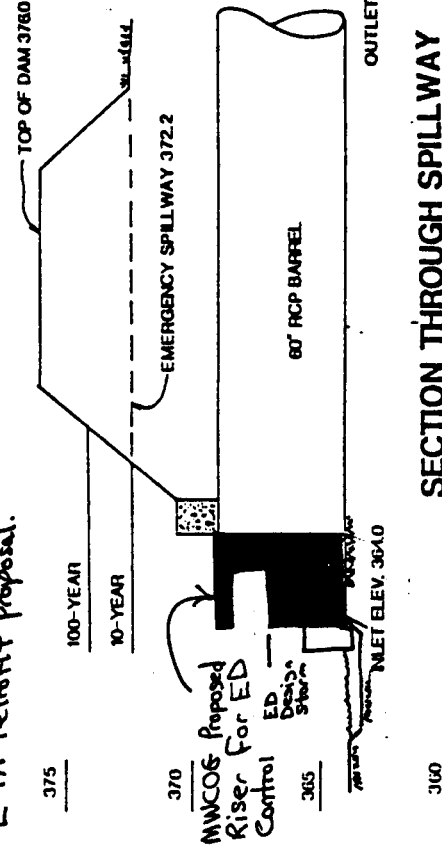
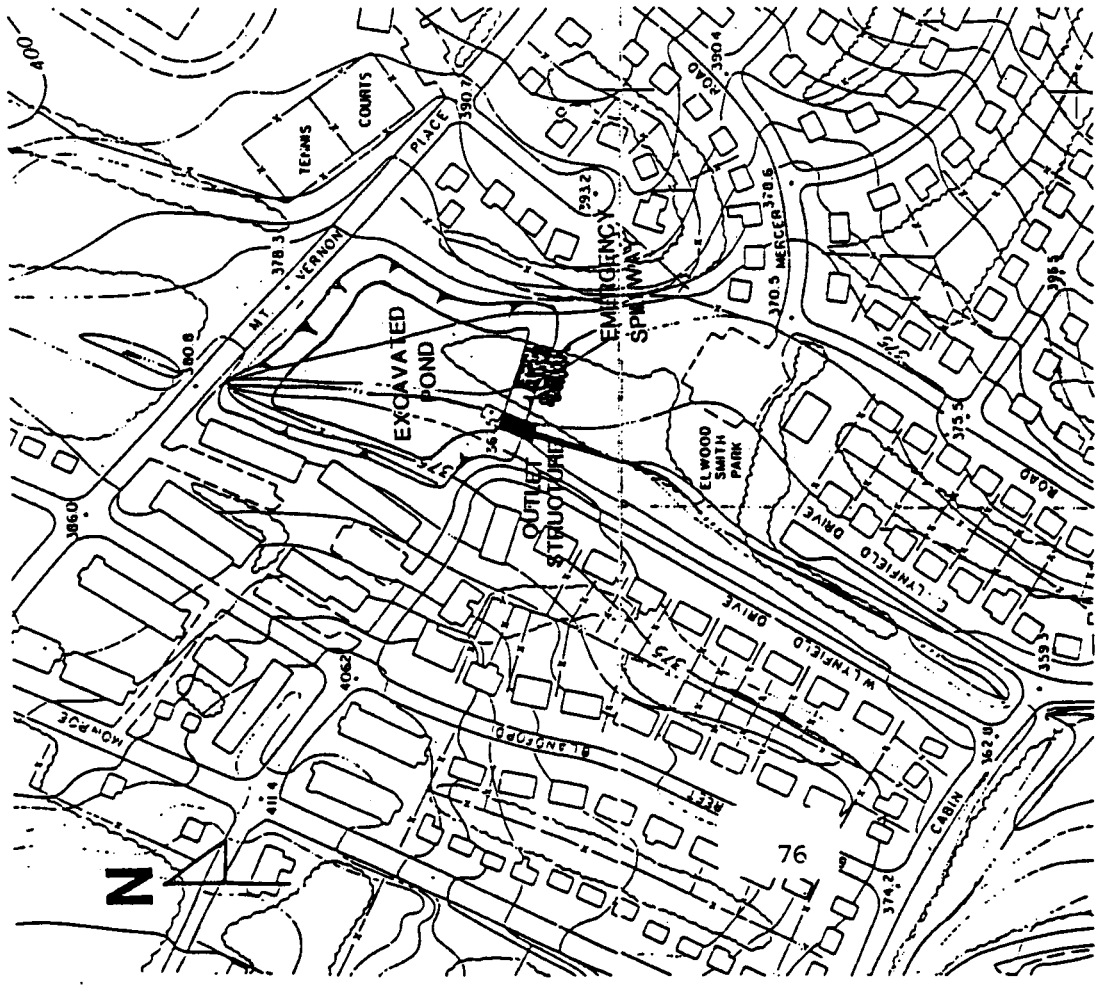
**DISCHARGES:**

Base	INFLOW (CFS)		OUTFLOW (CFS)	
	Existing	Future	Future	Policy
2-Year Storm	81	231	245	81
10-Year Storm	230	488	487	10/2
100-Year Storm	493	866	891	891

**Background:**

- D.A. - 184.6 ac
- Imperviousness - 45%
- Impervious Area - 83.1 ac
- ED Design - variable
- ED Storage Vol. - 15.1 ac-ft (Max.)

\* Note, COE concept adds ED control feature to earlier ETA retrofit proposal.



## SECTION THROUGH SPILLWAY

SCALE 1" = 200'

PROPOSED

<p>DEPARTMENT OF PUBLIC WORKS CITY OF <b>ROCKVILLE</b> MARYLAND AT VINSON ROCKVILLE, MARYLAND</p>	<p>ENGINEERING TECHNOLOGIES ASSOCIATES, INC. ENGINEERS, SURVEYORS, CONSTRUCTION MANAGERS 9081 BALTIMORE NATIONAL PIKE ELLICOTT CITY, MD. (301) 481-9920 21043</p>	<p>STORMWATER MANAGEMENT EVALUATION STRUCTURE INVENTORY FEBRUARY 1980</p>	<p>CABIN JOHN BRANCH ELWOOD SMITH PARK FACILITY ROCKVILLE # 93 STRUCTURE 5</p>
	<p>PROPOSED</p>	<p>SECTION THROUGH SPILLWAY</p>	<p>PROPOSED</p>

# Proposed Rockville Heights ED Marsh Retrofit\*

SWM SITE: ROCKVILLE HEIGHTS  
 LOCATION: Between Washington and Adams Streets  
 Cabin John Branch  
 DATE: 3/87  
 Date from Plans and Report

ROAD DATA:  
 Drainage Area: 24.9 AC. - Subbasin C3  
 Structure Height: 6.9 FT.  
 Embankment Length: N/A  
 Storage below dam freeboard: 3.5 AC-FT.  
 Freeboard elev.: 418.3 FT.

**OUTLET WORKS:**

15" Low Flow Orifice - Invert Elevation = 418.9 FT.  
 1'-0" Slot in Box Riser - Gross Elevation = 418.9 FT.  
 42" RCP Barrel - Inlet Invert Elev. = 408.5 FT.

ELEVATIONS AND FLOOD STORAGE (ultimate conditions):

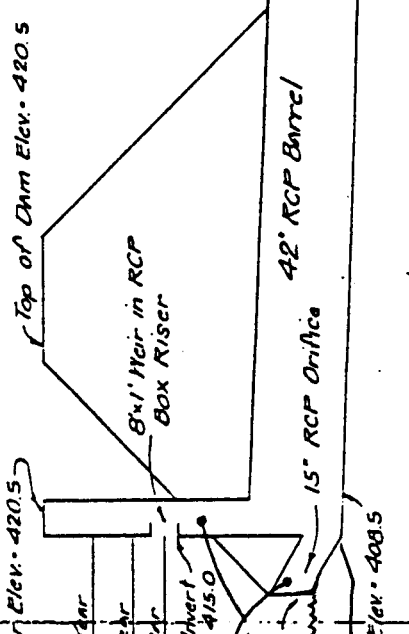
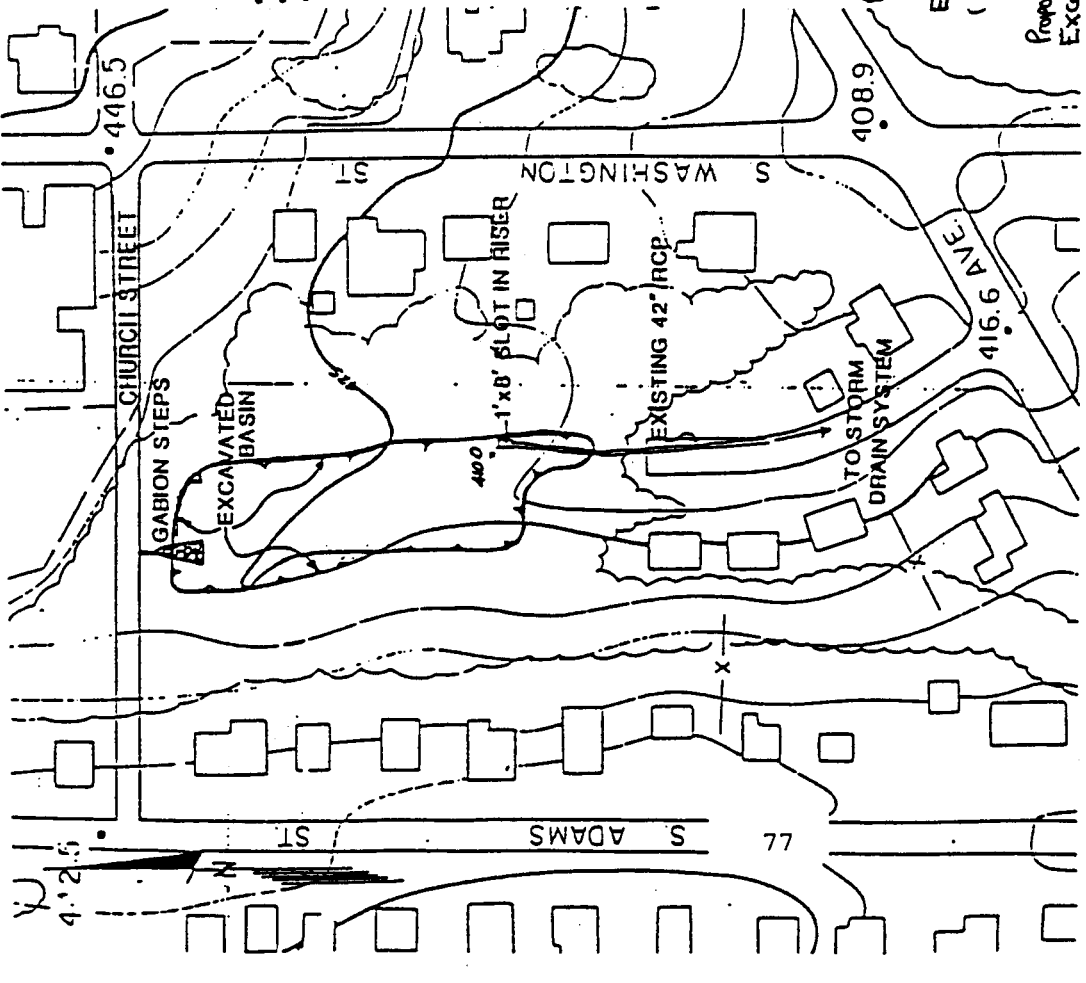
ELEVATION	STORAGE
N/A	N/A
415.5 FT.	1.3 AC-FT.
418.0 FT.	1.9 AC-FT.
418.5 FT.	2.7 AC-FT.

Base	INFLOW (cfs)		OUTFLOW (cfs)	
	Existing	Future	Existing	Future
2-Year Storm	6	42	15	25
10-Year Storm	26	88	51	68
100-Year Storm	81	128	133	78

**Background:**

- D.A. - 24.29
- Imperviousness - 45%
- ImperVIOUS
- Average - 10.9 ac pool
- Remanufactured Surface Area - 0.18 ac
- Permanent Pool Vol. - 0.27 ac-ft
- ED Design - 0.5 gpa/ac
- ED Storage Vol. - 0.45 ac-ft

\* Note MWHOG retrofit concept sacrifices current 10-yr storage. Riser Elev. 420.5



SECTION THROUGH FACILITY

SCALE 1" = 100'

<p> <b>ROCKVILLE</b>          MARYLAND AT VINSON          ROCKVILLE, MARYLAND       </p>	<p>         DEPARTMENT OF PUBLIC WORKS          CITY OF  <b>ROCKVILLE</b>          MARYLAND AT VINSON          ROCKVILLE, MARYLAND       </p>	<p>         ENGINEERING TECHNOLOGIES          ASSOCIATES, INC.          ENGINEERS, SURVEYORS, CONSTRUCTION MANAGERS          9051 BALTIMORE NATIONAL PIKE ELLICOTT CITY, MD.          21043          (301) 461-8820       </p>	<p>         STORMWATER MANAGEMENT          EVALUATION          STRUCTURE INVENTORY          FEBRUARY 1986       </p>	<p>         CABIN JOHN BRANCH          ROCKVILLE HEIGHTS FACILITY          ROCKVILLE # 3C          STRUCTURE 3       </p>
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# Proposed New Mark Commons - ED Wet Pond Retrofit\*

**SWM SITE:** NEW MARK COMMONS LAKE  
**LOCATION:** North of Woodlawn Circle  
 Cabin John Branch  
**DATE:** 7/88  
 Date from top maps and lake wetland study

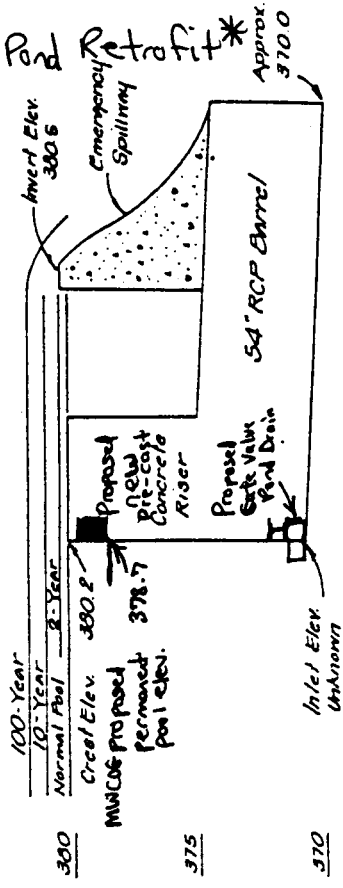
**POND DATA:**  
 Drainage Area: 188.5 Ac. - Subbasin C8  
 Structure Height: Approx. 18 ft.  
 Embankment Length: N/A  
 Storage below dam (reservoir): 128.3 Ac-ft.  
 Reservoir elev.: 305.5 ft.

**OUTLET WORKS:**  
 4'-4" Concrete Box Sizer - Crest Elevation - 308.2 ft.  
 6'-RCP Barrel - Inlet Invert Elevation - Unknown  
 Concrete Flume Spillway - Invert Elevation - 308.5 ft.

**POOL ELEVATIONS AND FLOOD STORAGE (ultimate conditions):**

ELEVATION	INFLOW (cfs)		OUTFLOW (cfs)		STORAGE
	Existing	Future	Existing	Future	
Normal Pool	20	194	98	98	0.8 Ac-ft.
2-Year Storm	223	244	238	197	2.4 Ac-ft.
10-Year Storm	281	414	405	308	5.3 Ac-ft.
100-Year Storm					7.6 Ac-ft.

\*Note, MWCOG  
 retrofit concept  
 replaces ex. riser for  
 ED control &  
 lowers ex.  
 permanent pool elev.



## SECTION THROUGH FACILITY

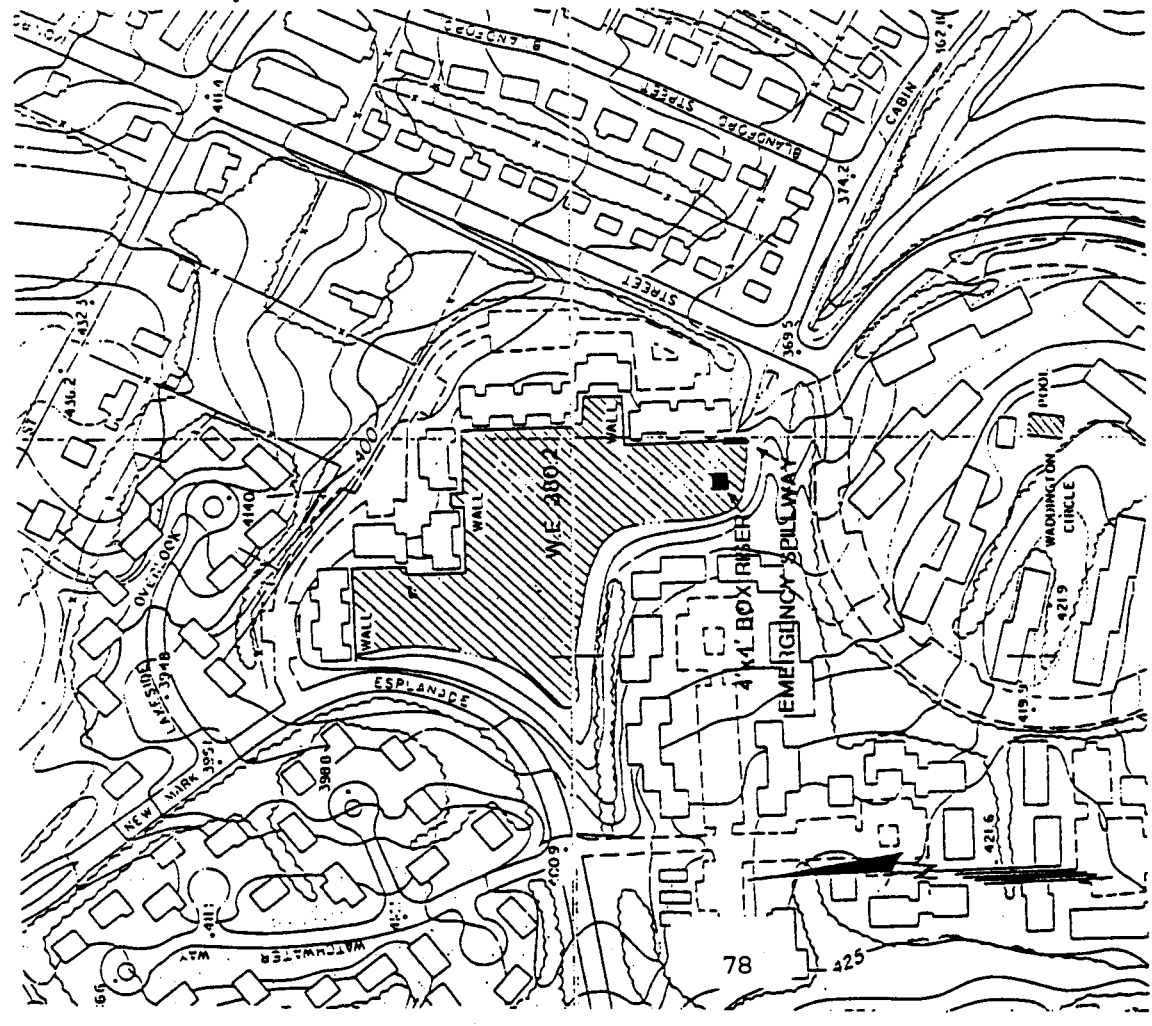
**STORMWATER MANAGEMENT EVALUATION**  
**STRUCTURE INVENTORY**  
 FEBRUARY 1988

**ENGINEERING TECHNOLOGIES ASSOCIATES, INC.**  
 ENGINEERS, SURVEYORS, CONSTRUCTION MANAGERS  
 9051 BALTIMORE NATIONAL PIKE ELLICOTT CITY, MD.  
 (301) 461-8920 21043

DEPARTMENT OF PUBLIC WORKS  
 CITY OF  
**ROCKVILLE**  
 MARYLAND AT VINSON  
 ROCKVILLE, MARYLAND

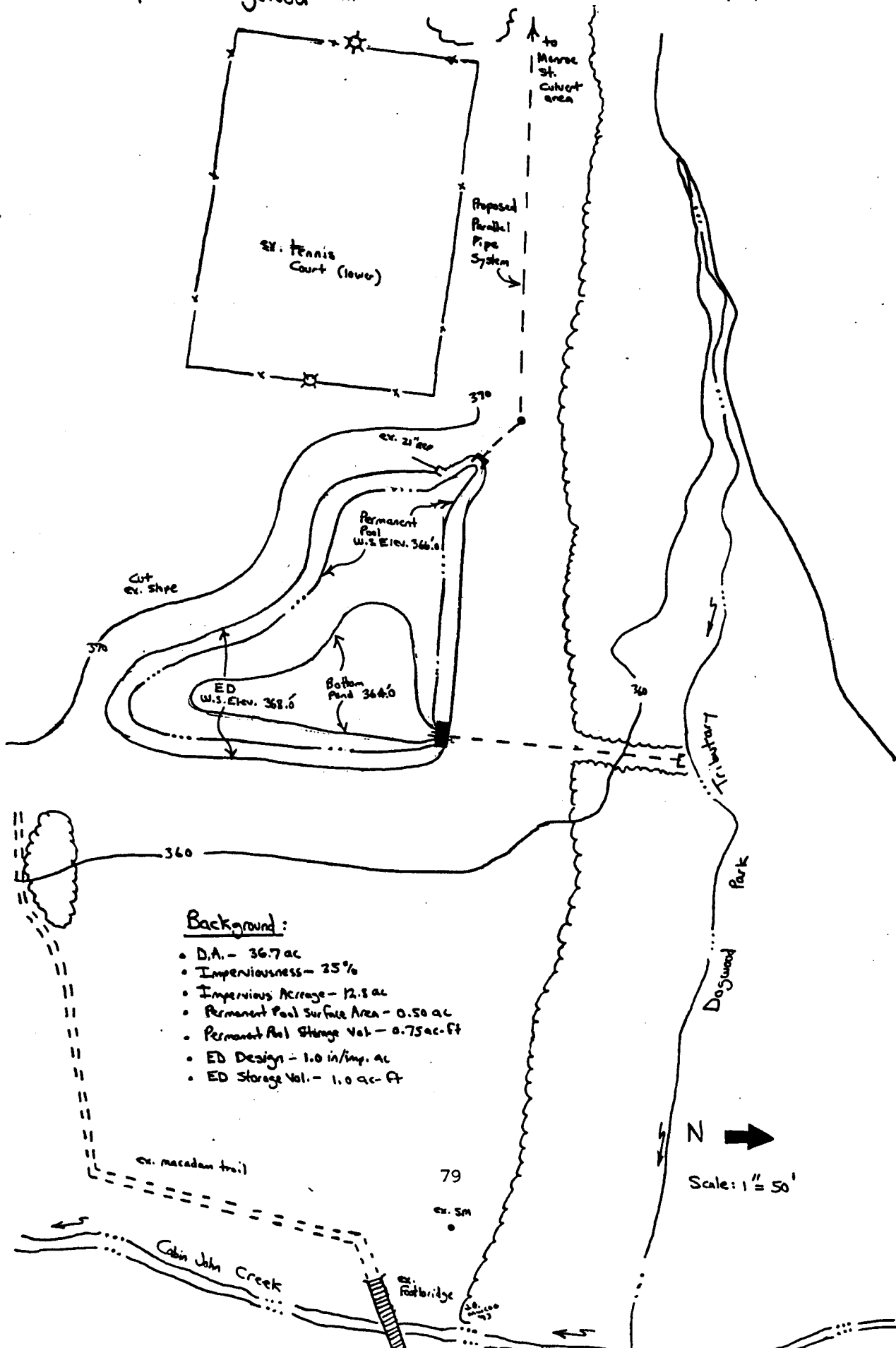
**ROCKVILLE**  
 MARYLAND

**CABIN JOHN BRANCH**  
**NEW MARK COMMONS LAKE**  
**STRUCTURE 7**



SCALE 1" = 200'

# Proposed Dogwood Park - Off-Line ED Marsh Retrofit



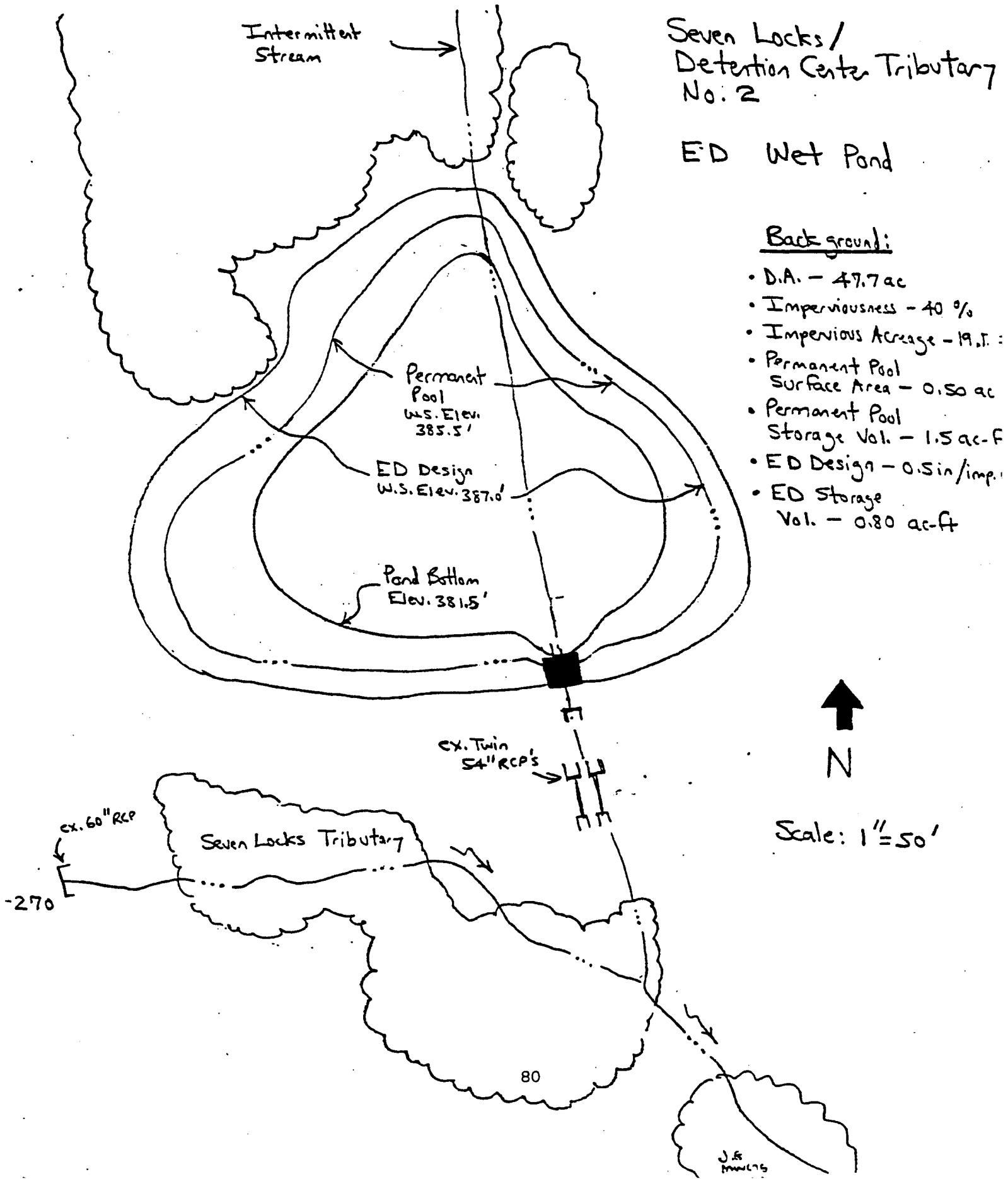
# Proposed

## Seven Locks / Detention Center Tributary No. 2

### ED Wet Pond

#### Background:

- D.A. - 47.7 ac
- Imperviousness - 40 %
- Impervious Acreage - 19.1 :
- Permanent Pool  
Surface Area - 0.50 ac
- Permanent Pool  
Storage Vol. - 1.5 ac-ft
- ED Design - 0.5 in/imp.
- ED Storage  
Vol. - 0.80 ac-ft

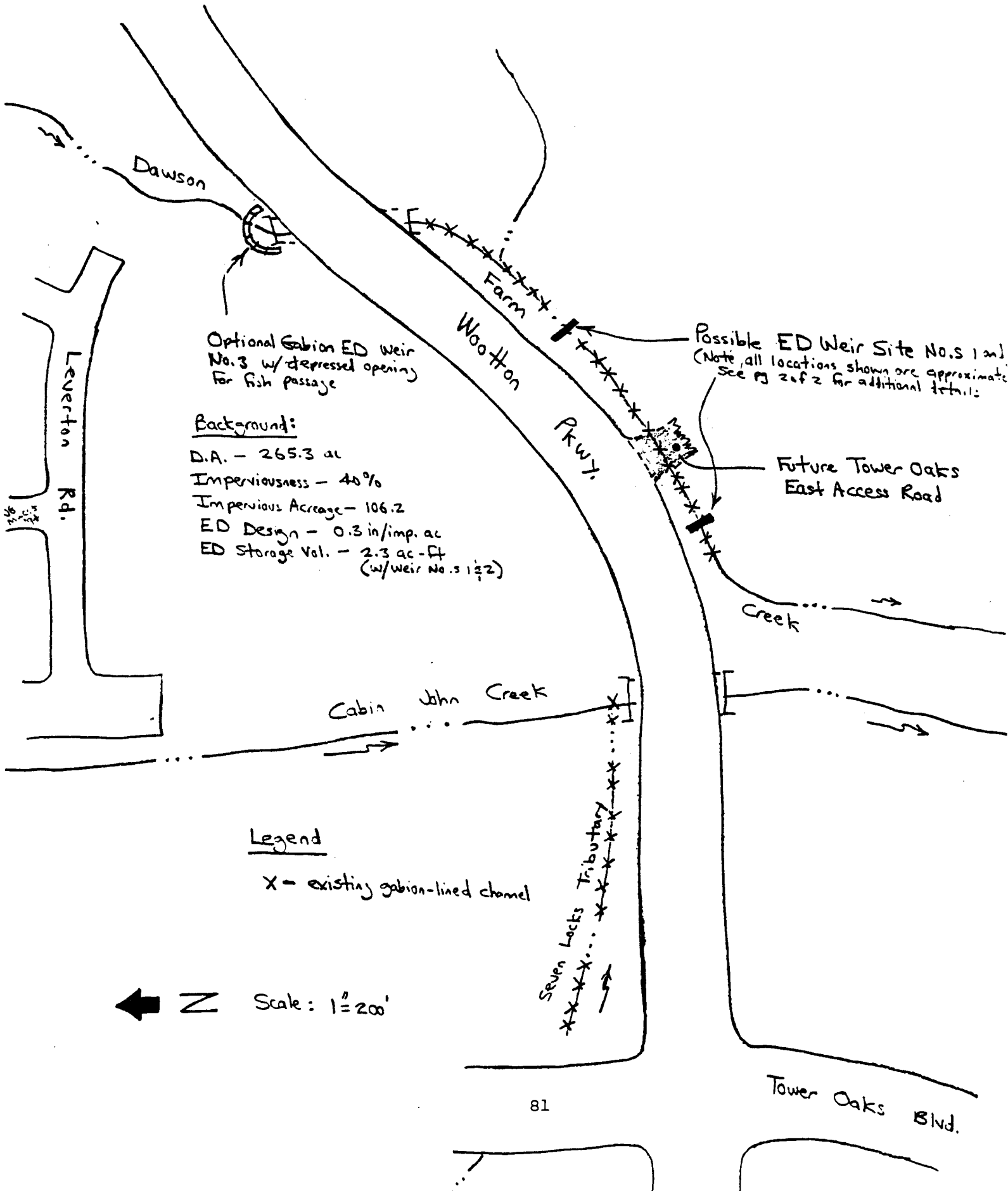


Scale: 1" = 50'

80

J.R.  
11/11/15

# Proposed Wootton Parkway ED Weirs: (1 of 2)



Optional Gabion ED Weir No. 3 w/ depressed opening for fish passage

Background:

- D.A. - 265.3 ac
- Imperviousness - 40%
- Impervious Acreage - 106.2
- ED Design - 0.3 in/imp. ac
- ED Storage Vol. - 2.3 ac-ft (w/weir No.s 1 & 2)

Possible ED Weir Site No.s 1 and 2  
(Note, all locations shown are approximate. See p 2 of 2 for additional details.)

Future Tower Oaks East Access Road

Legend

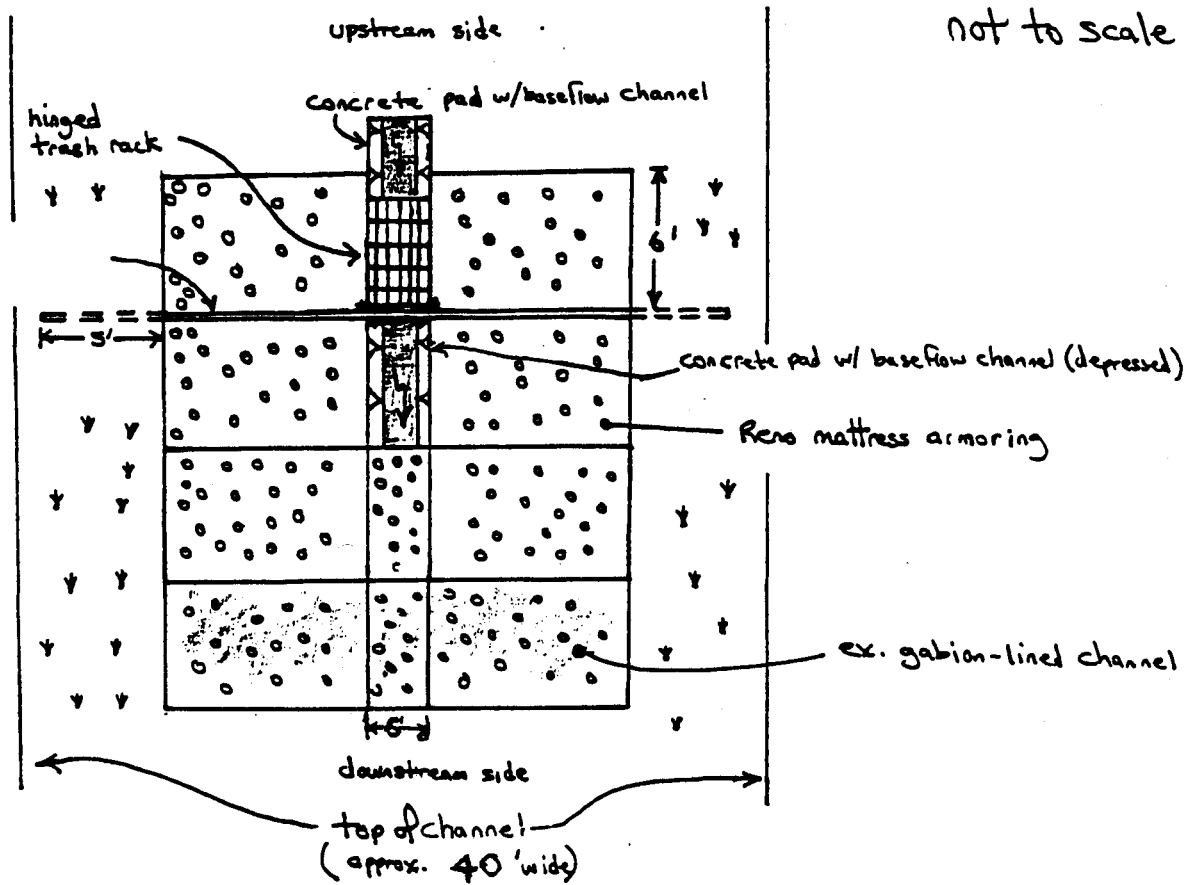
X = existing gabion-lined channel

← N Scale: 1" = 200'

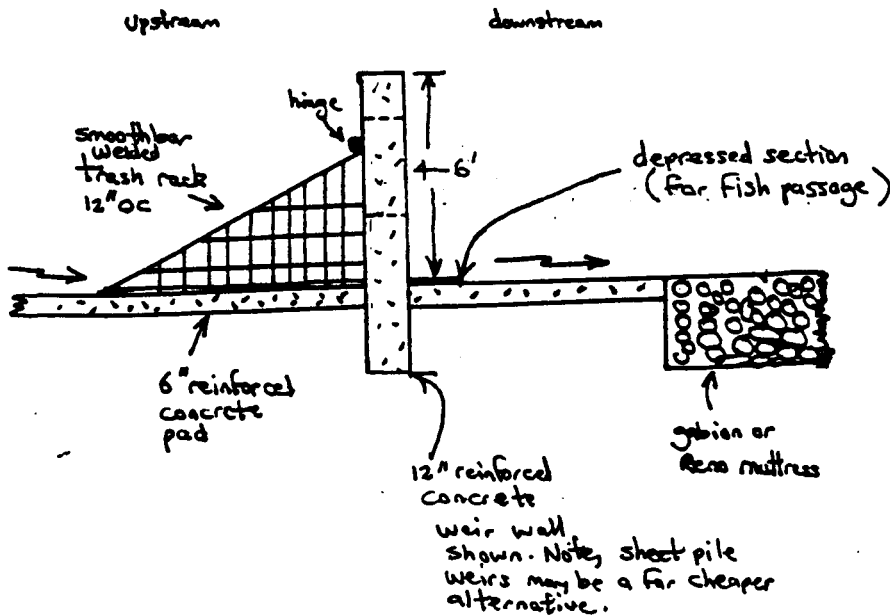
Tower Oaks Blvd.

# Possible Channel Modification for ED Weir System: (2 of 2)

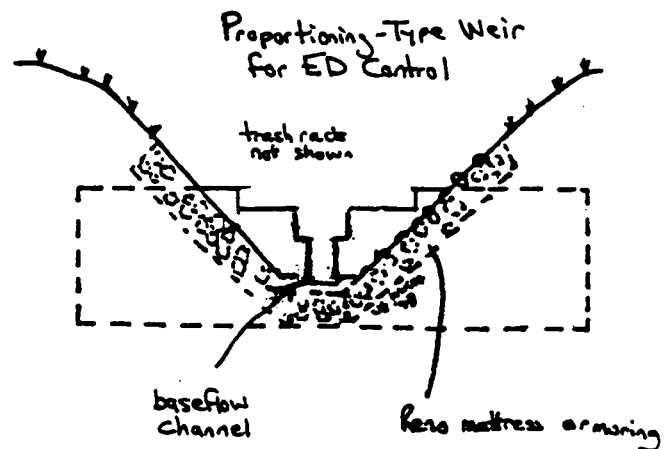
## Plan View:



## Profile:



## Front View:

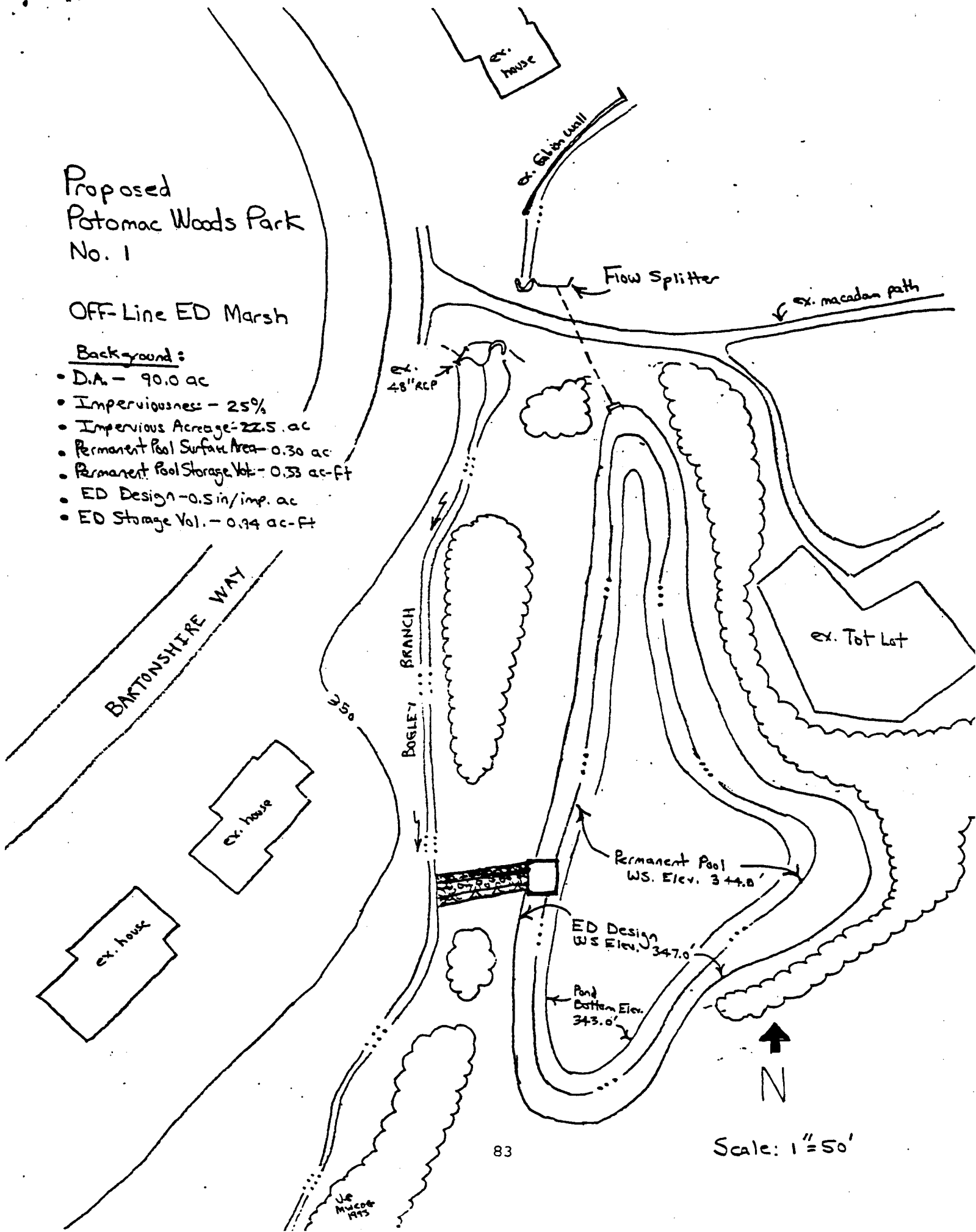


# Proposed Potomac Woods Park No. 1

## OFF-Line ED Marsh

### Background:

- D.A. - 90.0 ac
- Imperviousness - 25%
- Impervious Acreage - 22.5 ac
- Permanent Pool Surface Area - 0.30 ac
- Permanent Pool Storage Vol. - 0.33 ac-ft
- ED Design - 0.5 in/imp. ac
- ED Storage Vol. - 0.94 ac-ft

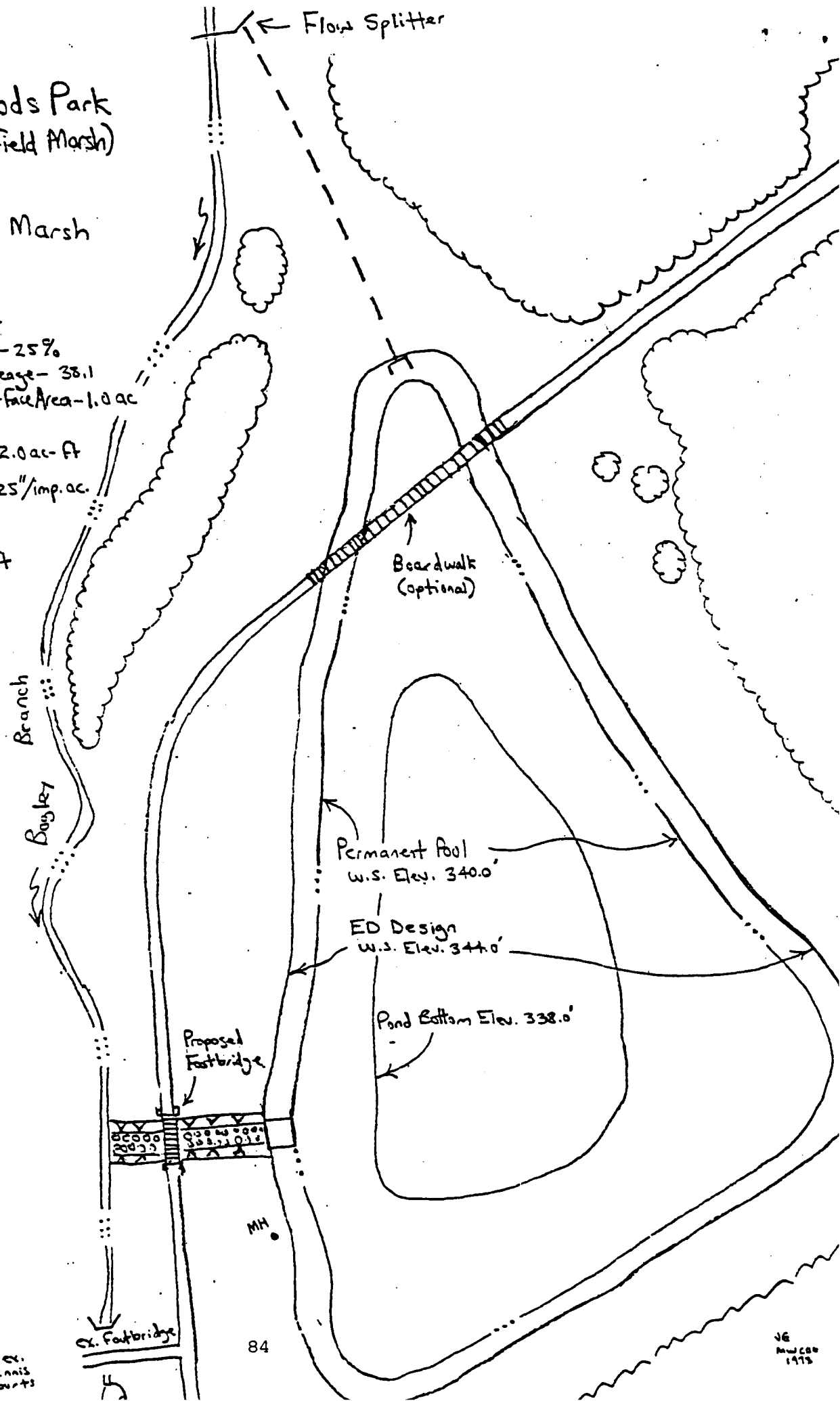


# Proposed Potomac Woods Park No. 2 (Ballfield Marsh)

## Off-Line ED Marsh

### Background:

- D.A. - 152.4 ac
- Imperviousness - 25%
- Impervious Acreage - 38.1
- Permanent Pool Surface Area - 1.0 ac
- Permanent Pool Storage Vol. - 2.0 ac-ft
- ED Design - 1.25"/imp. ac.
- ED Storage Vol. - 4.0 ac-ft



Scale: 1" = 50'

To ex. Tennis Courts

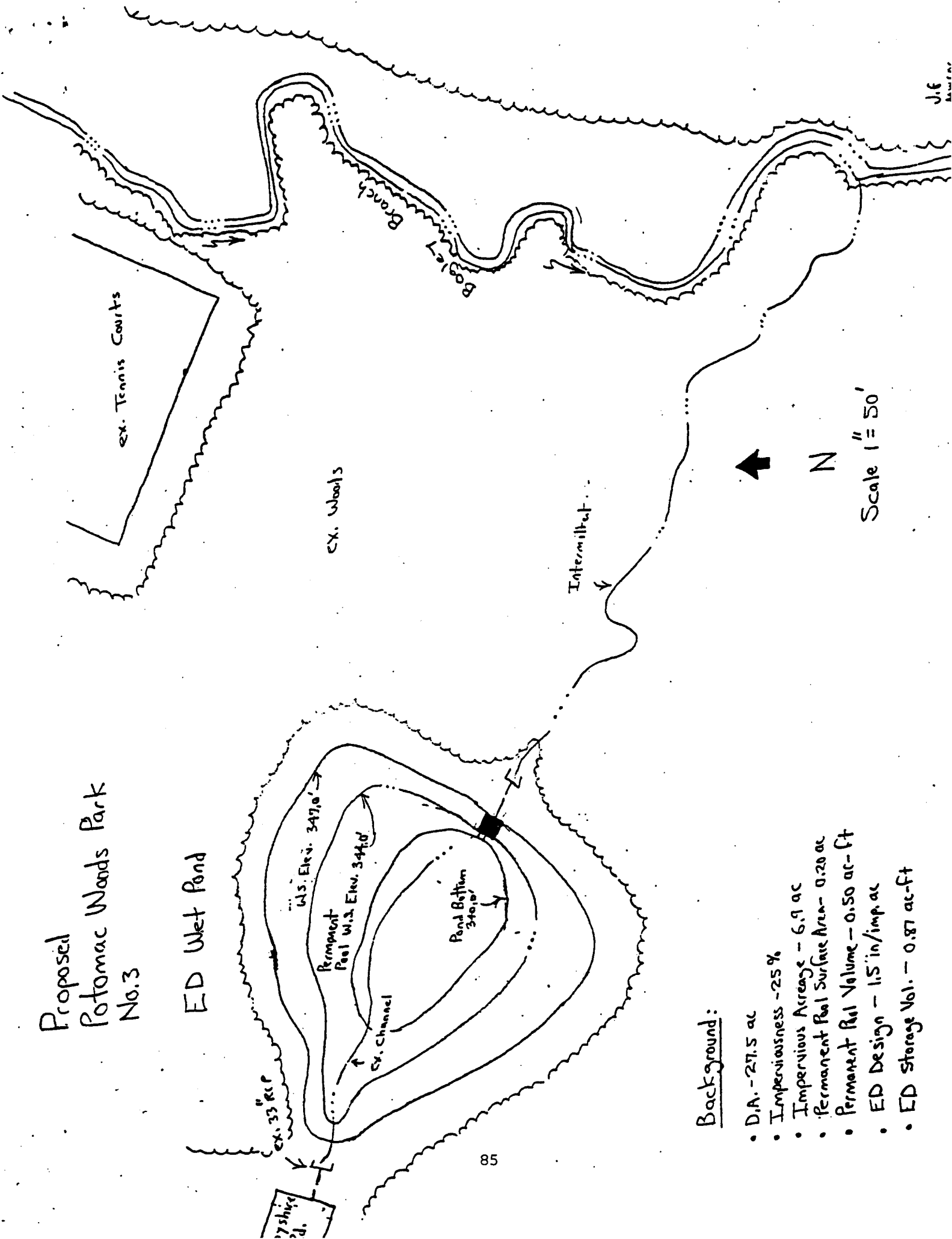
MH

84

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Proposed  
Potomac Woods Park  
No.3

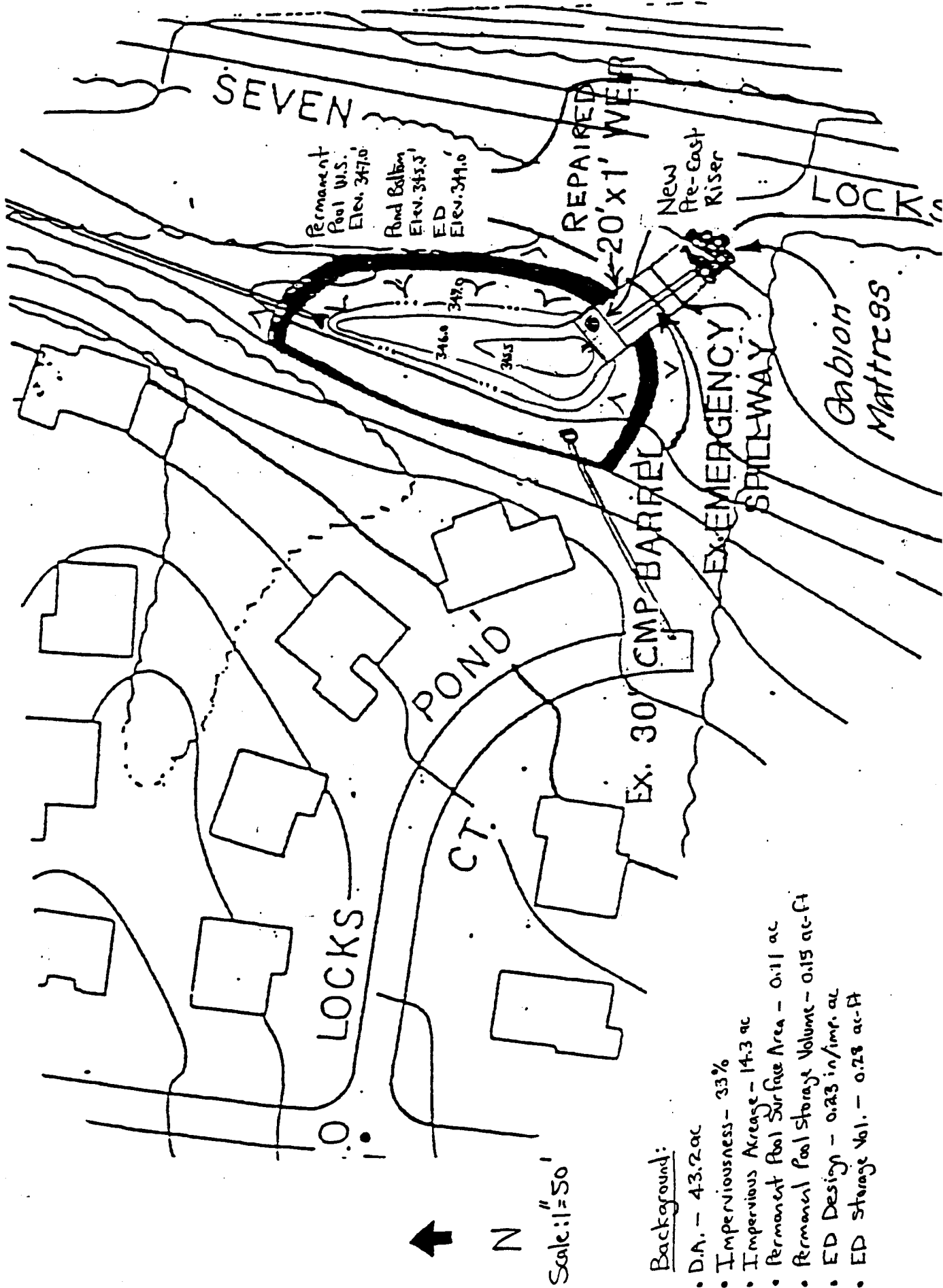
ED Wet Pond



Background:

- D.A. - 27.5 ac
- Imperviousness - 25%
- Impervious Acreage - 6.9 ac
- Permanent Pool Surface Area - 0.20 ac
- Permanent Pool Volume - 0.50 ac-ft
- ED Design - 1.5" in/imp ac
- ED Storage Vol. - 0.87 ac-ft

# Proposed Locks Pond Court - ED Marsh Retrofit



Background:

- D.A. - 43.2 ac
- Imperviousness - 33%
- Impervious Acreage - 14.3 ac
- Permanent Pool Surface Area - 0.11 ac
- Permanent Pool Storage Volume - 0.15 ac-ft
- ED Design - 0.23 in/imp. ac
- ED Storage Vol. - 0.28 ac-ft

# Proposed North Farm ED Marsh Retrofit \*

DATE: 3/77  
 Date from Plans

SUB SITE: NORTH FARM  
 LOCATION: North of Farm Haven Court  
 Cabin John Branch

- Background:**
- DA - 21.7AC
  - Imperv - 2.5%
  - Imperv - 5.4%
  - Percol - 5.4%
  - Percol - 0.5%
  - ED Design - 1/4" at freboard elev. = 321.9 ft.
  - ED Storage
  - Vol. - 1.8 ac-ft

- POND DATA:**
- 21.7 AC. - Subbasin C18
  - 11.6 ft.
  - 228.8 ft.
  - 2.6 AC-ft.
  - 321.9 ft.

- OUTLET WORKS:**
- 18" Low Flow Orifice - Invert Elevation - 311.0 ft.
  - 36" CAP Riser - Crest Elevation - 320.2 ft.
  - 21" CAP Barrel - Inlet Invert Elevation - 311.0 ft.
  - 36" Crested Spillway - Crest Elevation - 320.6 ft.

**POOL ELEVATIONS AND FLOOD STORAGE (ultimate conditions):**

ELEVATION	STORAGE
M/A	M/A
311.0 ft.	0.3 AC-ft.
310.1 ft.	1.2 AC-ft.
321.0 ft.	2.1 AC-ft.

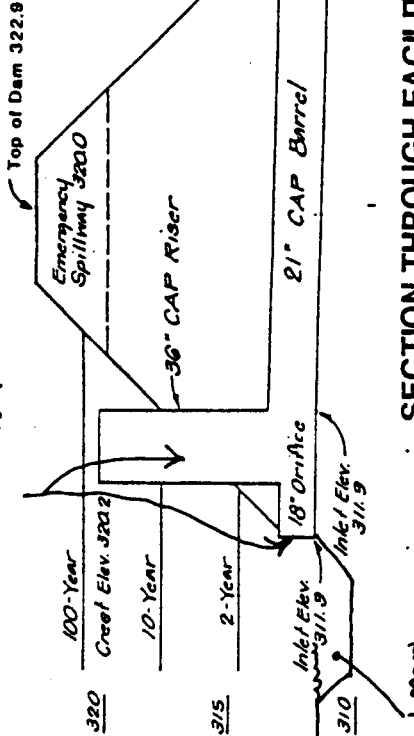
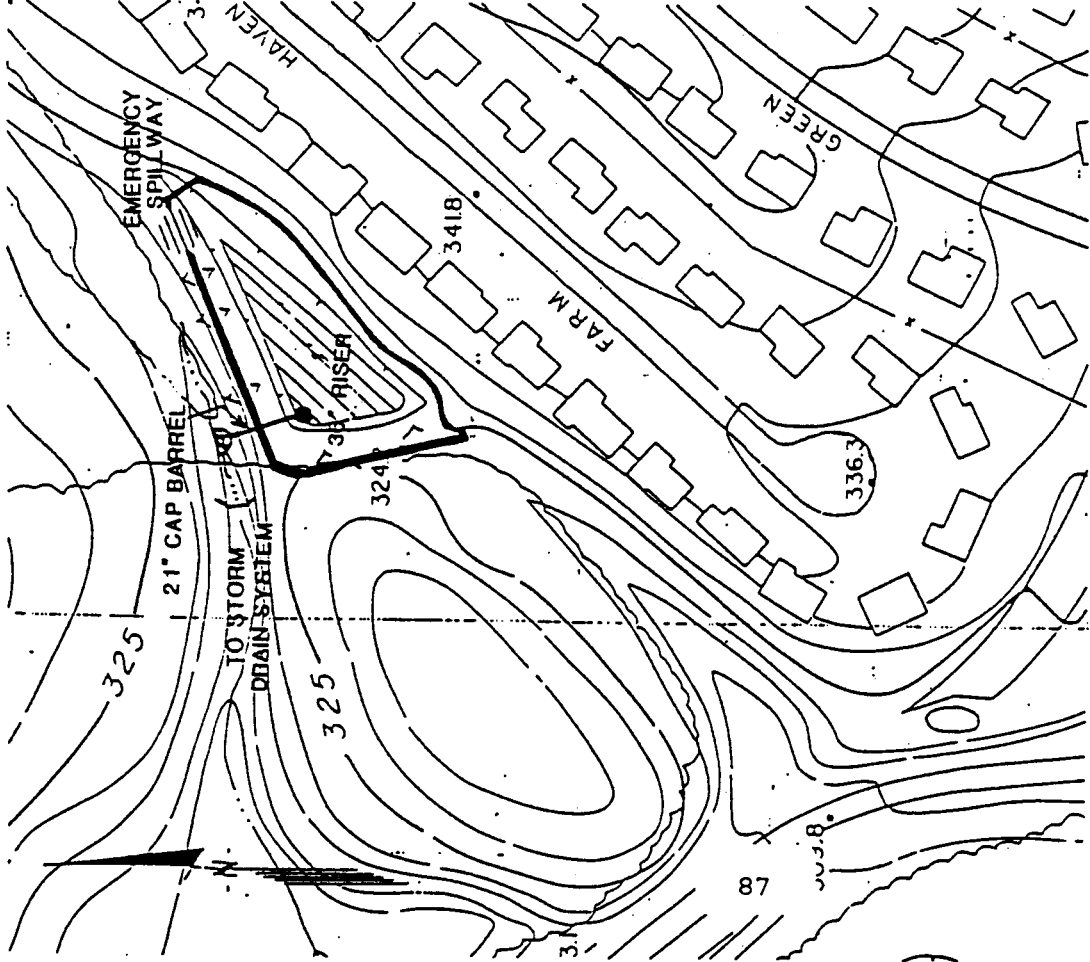
**INFLOW (cfs)**

Mass	Existing	Future	OUTFLOW (cfs)
2-Year Storm	6	23	12
10-Year Storm	31	88	26
100-Year Storm	66	105	40

**\* NOTE: MINOR retrofit concept involves excavating ex. dry pond for marsh creation & riser modifications for ED control.**

**Concept/Sacrifices ex. 10-yr control. 100-Year Storm**

**Proposed Riser Modifications for ED control**



Proposed Excavated Marsh

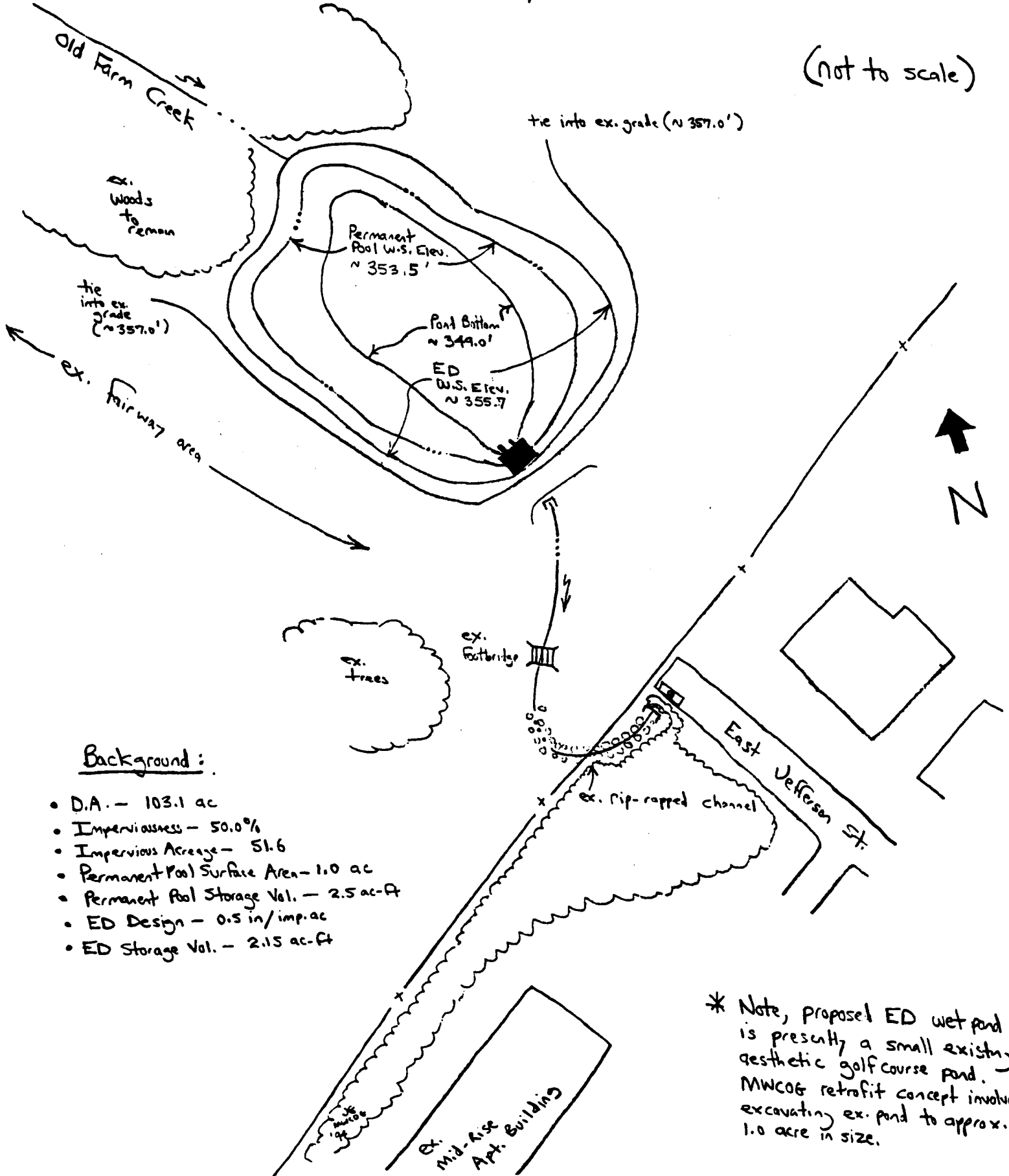
SCALE 1" = 100'

## SECTION THROUGH FACILITY

<p>DEPARTMENT OF PUBLIC WORKS                  CITY OF  <b>ROCKVILLE</b>                  MARYLAND AT VINSON                  ROCKVILLE, MARYLAND</p>	<p>ENGINEERING TECHNOLOGIES                  ASSOCIATES, INC.                  ENGINEERS, SURVEYORS, CONSTRUCTION MANAGERS                  9051 BALTIMORE NATIONAL PIKE ELLICOTT CITY, MD.                  (301) 481-8820 21043</p>	<p>STORMWATER MANAGEMENT                  EVALUATION                  STRUCTURE INVENTORY                  FEBRUARY 1988</p>	<p>CABIN JOHN BRANCH                  NORTH FARM FACILITY                  ROCKVILLE # 20 STRUCTURE 24</p>
	<p>SECTION THROUGH FACILITY</p>		

# Proposed Woodmont Country Club - ED Wet Pond Retrofit\*

(not to scale)



## Background:

- D.A. - 103.1 ac
- Imperviousness - 50.0%
- Impervious Acreage - 51.6
- Permanent Pool Surface Area - 1.0 ac
- Permanent Pool Storage Vol. - 2.5 ac-ft
- ED Design - 0.5 in/imp.ac
- ED Storage Vol. - 2.15 ac-ft

\* Note, proposed ED wet pond is presently a small existing aesthetic golf course pond. MWC06 retrofit concept involves excavating ex. pond to approx. 1.0 acre in size.

# Proposed Montrose Park On-Line ED Dry Pond Retrofit \*

DATE: 12/03  
 REVISED: 4/04  
 Date from  
 Feasibility study  
 City of Rockville

SWM SITE: MONTROSE PARK  
 LOCATION: Martha Terrace - Old Farm Branch  
 POND DATA:  
 Drainage Area - 381.9 AC - Subbasin F1  
 Structure Height - 22 FT.  
 Embankment Length - 78 FT.  
 Storage below dam (freeboard) - 25.1 AC-ft.  
 Freeboard elev. - 338.8 FT.

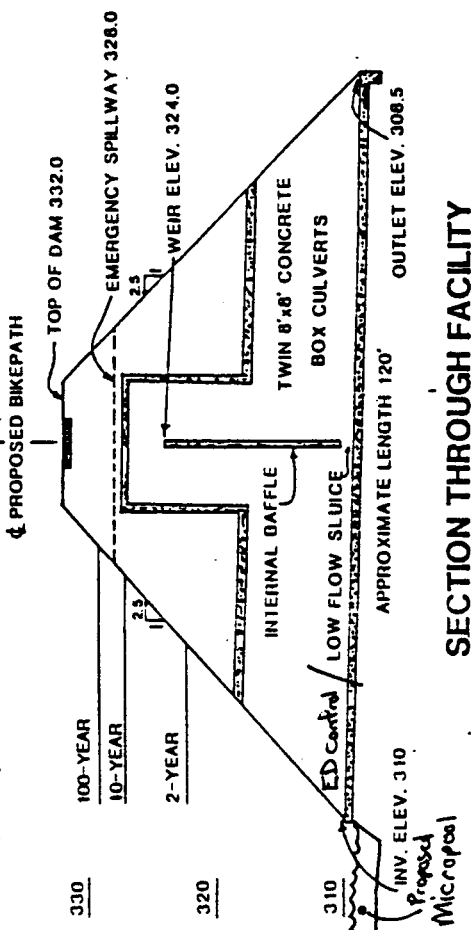
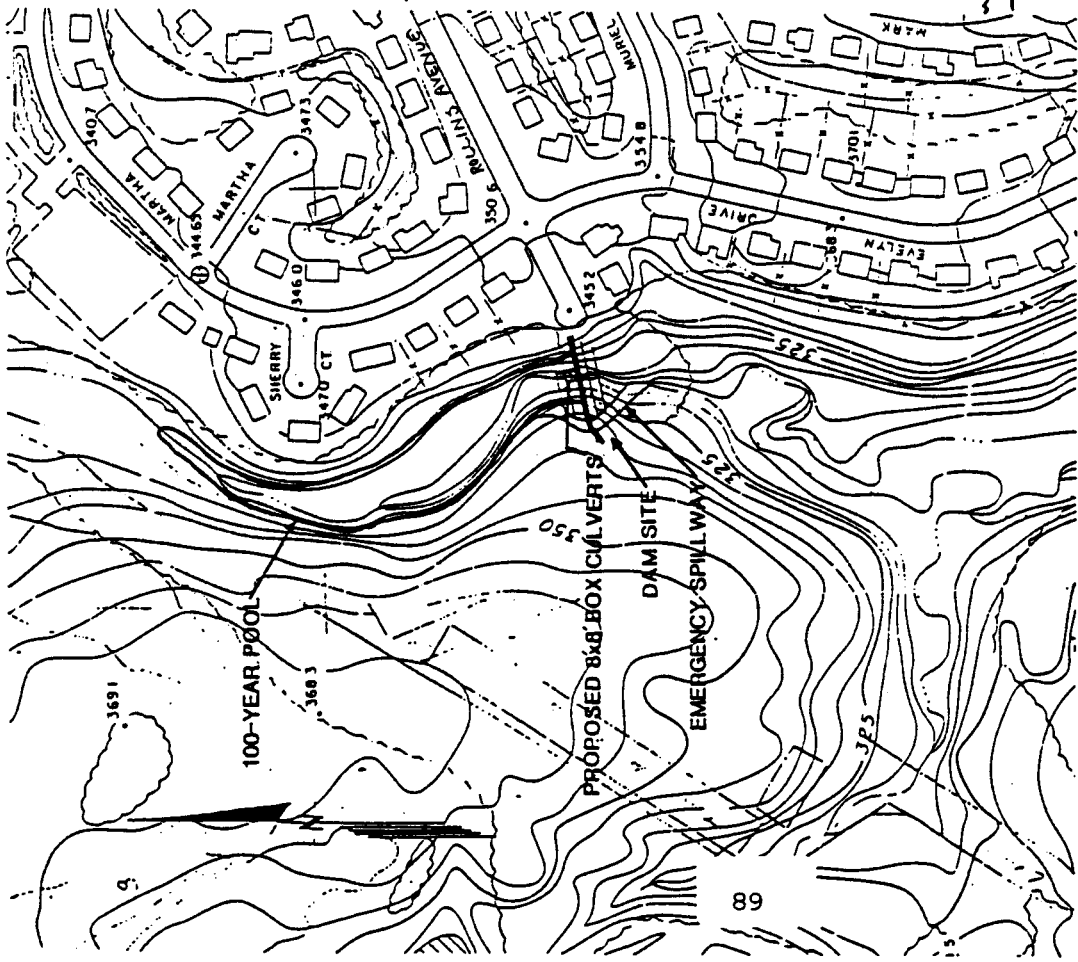
- Background:**
- D.A. - 381.9 ac
  - Imperviousness - 44%
  - Imp. Storage - 152.8 ac-ft
  - Perm. pool Surface Area - 0.2 ac
  - ED Design - Variable
  - ED Storage Vol. - 14.9 ac-ft (max)

OUTLET WORKS:  
 Low Flow Orifice - Invert Elevation - 309.3 Ft.  
 31" Weir - Crest Elevation - 324.0 Ft.  
 (2) 8'-up box Culverts - Inlet Invert Elev. - 318.0 Ft.  
 52' emergency spillway - Crest Elevation - 328.0 Ft.

POOL ELEVATIONS AND FLOOD STORAGE (ultimate conditions):

ELEVATION	STORAGE	INFLOW (cfs)		OUTFLOW (cfs)	
		Existing	Future	Existing	Future
W/A	W/A				
Normal Pool	522.5 FT.	94	282	313	218
2-Year Storm	323.7 FT.	358	839	718	582
10-Year Storm	329.6 FT.	758	1188	1182	933
100-Year Storm					1888

\* Note, MNCOG Concept involves adding ED Control to existing ETA concept as well as incorporation of a Micro-pool feature.



## SECTION THROUGH FACILITY

SCALE 1" = 200'

<p>DEPARTMENT OF PUBLIC WORKS                  CITY OF  <b>ROCKVILLE</b>                  MARYLAND AT VINSON                  ROCKVILLE, MARYLAND</p>	<p>ENGINEERING TECHNOLOGIES                  ASSOCIATES, INC.                  ENGINEERS, SURVEYORS, CONSTRUCTION MANAGERS                  8051 BALTIMORE NATIONAL PIKE ELLICOTT CITY, MD. 21043                  (301) 481-8820</p>	<p>STORMWATER MANAGEMENT                  EVALUATION                  STRUCTURE INVENTORY                  FEBRUARY 1988</p>	<p>CABIN JOHN BRANCH                  MONTROSE PARK FACILITY                  ROCKVILLE # 11 STRUCTURE 35</p>
	<p>SECTION THROUGH FACILITY</p>		

**Appendix D.**

**Preliminary SWM Retrofit Cost Estimate Breakdown 1/**

**1-A. Fleet Street \***

approx. 8,333 yd3 (@ \$10/yd)

\$61,000	Excavation & pipe disposal
\$25,000	Riser
\$30,000	Gabion Weir
\$ 9,000	E&S (erosion & sediment ctrl.)
<u>\$10,000</u>	Landscaping
\$135,000	

**1-B. Mount Vernon Place**

approx. 1,129 yd3

\$15,000	Excavation
\$30,000	Riser
\$50,000	Culvert replacement & road work
\$10,000	E&S
<u>\$ 5,000</u>	Landscaping
\$110,000	

**2. Elwood Smith Park**

approx. 11,852 yd3

\$118,500	Excavation
\$ 41,500	Riser & Barrel
\$ 10,000	E&S
<u>\$ 5,000</u>	Landscaping
\$175,000	

**3. Rockville Heights**

approx. 581 yd3

\$ 6,000	Excavation
\$10,000	Riser mod./replacement
\$ 3,000	E&S
<u>\$ 2,000</u>	Landscaping
\$21,000	

**4. Hungerford Swim Center**

approx. 26,217 yd3

\$262,000	Excavation
\$ 50,000	Parallel pipe
\$ 10,000	Riser
\$ 10,000	Haul away concrete
\$ 10,000	E&S
\$ 10,000	Landscaping
<u>\$ 10,000</u>	Misc.
\$ 372,000	

**5. New Mark Commons \***

\$25,000	Riser mod./replace
\$10,000	Landscaping
<u>\$ 5,000</u>	E&S
\$40,000	

**6. Dogwood Park**

approx. 6,453 yd3

\$ 65,000	Excavation
\$ 15,000	Riser & barrel
\$ 40,000	Parallel pipe
\$ 5,000	E&S
<u>\$ 5,000</u>	Landscaping
\$130,000	

**7. Seven Locks Detention Center \***

approx. 5,500 yd3

\$ 60,000	Excavation
\$ 30,000	Riser & barrel
\$ 15,000	E&S
\$ 10,000	Landscaping
\$ 5,000	Tree removal
<u>\$ 10,000</u>	Misc.
\$130,000	

\* = Private site

1/ Note, costs shown do not include possible land acquisition, engineering and design, possible utility relocation and/or major contingency costs.

**8. Dawson Farm Park**

approx. 3,000 yd3

\$ 30,000	Excavation
\$ 30,000	Riser
\$ 30,000	Gabion spillway
\$ 10,000	E&S
\$ 10,000	Landscaping
<u>\$ 15,000</u>	Misc.
\$125,000	

**9. Wootton Parkway**

\$50,000	Concrete or gabion weirs(2)
\$10,000	Earthwork (fill)
\$ 5,000	Gabion repair
\$ 5,000	E&S
<u>\$ 5,000</u>	Landscaping
\$75,000	

**10. Potomac Woods No. 1**

approx. 1,936 yd3

\$20,000	Excavation
\$ 5,000	Tree removal
\$25,000	Parallel pipe
\$15,000	Control structure
\$ 5,000	E&S
\$ 1,000	Asphalt trail
<u>\$10,000</u>	Landscaping
\$81,000	

**Potomac Woods No. 2**

approx. 8,067 yd3

\$ 81,000	Excavation
\$ 40,000	Parallel pipe
\$ 25,000	Footbridge
\$ 25,000	Control structure
\$ 10,000	E&S
\$ 10,000	Landscaping
\$ 40,000	Boardwalk (optional)
<u>\$ 10,000</u>	Misc.
\$241,000	

**12. Potomac Woods No. 3**

approx. 968 yd3

\$10,000	Excavation
\$40,000	Riser & Barrel
\$ 5,000	Tree removal
\$10,000	E&S
<u>\$10,000</u>	Landscaping
\$75,000	

**13. Locks Pond Ct.**

approx. 354 yd3

\$ 3,500	Excavation
\$15,000	Riser
\$ 2,000	E&S
\$ 3,000	Landscaping
<u>\$ 4,500</u>	Misc.
\$28,000	

**14. Northfarm**

approx. 1,613 yd3

\$16,000	Excavation
\$ 2,000	Riser mod.
\$ 2,000	E&S
<u>\$ 2,000</u>	Landscaping
\$22,000	

**15. Woodmont Country Club \***

approx. 6,453 yd3

\$ 65,000	Excavation
\$ 40,000	Riser & barrel
\$ 10,000	E&S
\$ 10,000	Landscaping
<u>\$ 20,000</u>	Misc.
\$145,000	

**16. Montrose Park**

\$ 35,000	Earthwork
\$ 40,000	Riser & barrel
\$ 10,000	Tree removal
\$ 10,000	E&S
<u>\$ 5,000</u>	Landscaping
\$100,000	

