

FINAL FEASIBILITY REPORT  
ON  
FLOOD DAMAGE REDUCTION  
AND ECOSYSTEM RESTORATION  
FEASIBILITY STUDY  
WOODBIDGE RIVER BASIN,  
MIDDLESEX COUNTY, NEW JERSEY

**APPENDIX B**

GEOTECHNICAL ANALYSIS

## **Geotechnical Appendix**

WOODBIDGE, Middlesex County, New Jersey

### **PROJECT DESCRIPTION**

The U.S. Army Corps of Engineers, New York District, is evaluating potential flood damage reduction measures for the Woodbridge River, in Woodbridge, Middlesex County, New Jersey. The potential flood control structures include: 1) floodwall and/or levee system with raising the elevation of a road and 2) tide gate structure with levee system.

This geotechnical appendix is intended to be a summary of the regional and local geological conditions based on a review of existing data acquired for nearby projects.

### **SITE HISTORY**

Middlesex County is located in the eastern-central part of New Jersey and is part of the Piedmont and Coastal Plain physiographic provinces. Surface materials are unconsolidated Pleistocene and Holocene sediments overlying Jurassic-Triassic bedrock or Cretaceous Coastal Plain formations. In Middlesex County, the unconsolidated sediments include stream, wetland, glacial, estuarine, windblown, and hill-slope sediments and weathered bedrock material. Surface materials are as much as 140 feet thick, but are generally less than 40 feet thick over most of the county. These materials range from coarse gravel to clay and peat. The soils affect the movement of ground water from the surface into underlying bedrock and Coastal Plain aquifers, and are aquifers themselves in places (NJ Geologic Association DGS97-2).

### **SUBSURFACE EXPLORATION PLAN**

The New Jersey Turnpike Authority provided boring logs taken during the turnpike expansion (1985-1990). Warren George executed the borings. Five borings (boring numbers 86-55, 86-56, 86-57, 86-58, and 86-59; see attached map for boring locations) were taken near the Woodbridge River; Standard Penetration Test (SPT) procedures (140# hammer, 30-inch drop, 1 3/8in I.D.) and a tripod were used. Drilling depths ranged from 24' to 40' below ground surface. The location of the borings is north of the proposed flood damage reduction measures.

### **SUBSURFACE EXPLORATION RESULTS**

The borings show the area to be dominantly silt, sand and silt, and gravel and silt with some clean sand (see attached boring logs). The gray and brown sediments represent the Holocene and the red-brown sediments represent the Pleistocene. The top six to twelve feet below the ground surface contain organic material such as roots; this material can be classified as an OL, or organic silt and clay. The Pleistocene silts can be classified as an ML or inorganic silt. Overall, the sand encountered is loose to medium dense and the silts are very soft to very hard consistency. The sands can be classified as SM, silty sand

or SP, poorly graded sand. Water level readings were taken at two locations, boring 86-58 and 86-59 where the water levels were 3 feet (3') and 5 feet (5') below the ground surface. Pleistocene material is predominantly silt and clay. A cross-section (see attached) drawn between boring 85-66 and 85-58 shows the profile of soil in the area.

**TESTING**

During drilling, torvane and pocket penetrometer reading were taken. The following table shows the results:

<b>Boring Number</b>	<b>Depth</b>	<b>Torvane</b>	<b>Pocket Penetrometer (tsf)</b>
85-55	8-10'	0 tsf	--
	10-12'	0.35 tsf	--
	12-14'	--	3.0
86-58	0-2'	0.1 k9/cm2	0.75
	10-12'	0.45 k9/cm2	2.0
	15-17'	0.25 k9/cm2	0.75
	20-22'	0.45 k9/cm2	4.0
	25-27'	0.65 cm/ft2	2.5-4.0
	30-32'	0.1 k9/cm2	1.0-5.0

**GEOTECHNICAL ENGINEERING CONSIDERATIONS**

As the project progresses additional subsurface will need to be acquired in the actual area of the proposed flood damage reduction project. This additional data will be used to determine the soil properties that may affect excavation and costs. Sampling and testing should include undisturbed samples for consolidation in clays and permeability tests, constant head test for Sands.

# NJTP 86-55

## 3.33'

ELEVATION	DEPTH	RODS #	LEGEND	CLASSIFICATION OF MATERIALS <i>Description</i>	REMARKS
	1	1	S1	Brown, SILT	Roots
	2	1			
0	3	1	S2	Dark gray-black / brown SILT	some Root material
	4	1			
	5	1	S3	Dark gray SILT, little tan Sand	slight petroleum odor
	6	1			
	7	1	S4	Black SILT	petroleum odor
-5	8	1			petroleum odor
	9	1	S5		trace Roots
	10	1			
	11	1	S6	Gray, SILT, little fine Sand	trace Roots
	12	1			
-10	13	1	S7	Gray, very fine SAND and SILT	
	14	1			
	15	1	S8	Light-gray, coarse-fine SAND, trace fine Gravel, trace Silt	
	16	1			
	17	1	S9	Light-gray, coarse-fine SAND, trace coarse medium-fine Gravel, trace Silt	
-15	18	1			
	19	1	S10	Gray, medium-fine SAND, trace Silt	
	20	1			
	21	1	S11	Gray, fine SAND, trace Silt	
	22	1			
	23	1	S12	Gray, fine SAND, little Silt	
-20	24	1		Red-brown, SILT and fine SAND	
	25				
	26				
	27				
-25	28				
	29				
	30				
	31				
	32				
	33				
	34				
	35				
	36				
	37				
	38				
	39				
	40				

# NJTP 86-56

## 3.87'

ELEVATION	DEPTH	LOG #	SAMPLE NUMBER	LEGEND	CLASSIFICATION OF MATERIALS <i>(Description)</i>	REMARKS
	1	W0H	S1		Brown, SILT and CLAY	Roots
	2	W0H				
	3	W0H	S2		Brown-gray, SILT	Roots
	4	W0H				
0	5	0	S3			very soft Roots
	6	0				
	7	W0H	S4		Brown, SILT	soft trace Roots
	8	W0H				
-5	9	1	S5		Brown-gray, SILT, little Sand	soft
	10	1				
	11	2	S6		Brown-gray, Clayey SILT, trace Peat	
	12	3				
	13	5	S7			
-10	14	6				
	15	8	S8	•••	Black brown-gray, SAND, some Silt, trace Gravel	
	16	6				
	17	13	S9	•••	Gray, medium-fine SAND, little Silt	
	18	10				
-15	19	6	S10	•••	Gray, coarse-fine SAND, little Gravel, trace Silt	
	20	6				
	21	10	S11	•••	Red-brown, SILT, some fine Sand	
	22	10				
	23	6	S12	•••	Red-brown, SILT and SAND, some Gravel	
-20	24	6				
	25					
	26					
	27					
	28					
-25	29					
	30					
	31					
	32					
	33					
-30	34					
	35					
	36					
	37					
	38					
	39					
	40					

NJTP 86-57						
2.21'						
ELEVATION	DEPTH	NO. OF SAMPLES	SAMPLE NUMBER	LEGEND	CLASSIFICATION OF MATERIALS <i>(Description)</i>	REMARKS
0	1	1	S1		Top Soil	
	2	1			Brown, clayey SILT	
	3	1				
	4	1				
	5	1				
-5	6	3	S2		Tan, medium-fine SAND, little gray silt	
	7	2				
	8	1				
	9	1				
-10	10	4	S3		Gray, SILT, some medium-fine Sand	
	11	5				
	12	16				
	13	22				
	14	1				
-15	15	17	S4		Red-brown, SILT, some coarse-medium Gravel, trace fine Sand	
	16	16				
	17	9				
	18	10				
	19	1				
-20	20	MCH	S5		Red-brown, SILT, little medium-fine Gravel	
	21	4				
	22	4				
	23	1				
	24	1				
-25	25	3	S6		Red-brown, SILT, trace fine Gravel	
	26	8				
	27	16				
	28	17				
	29	1				
-30	30	20	S7		Red-brown, SILT, little medium Gravel	hard
	31	36				
	32	39				
	33	40				
	34	1				
-35	35	42	S8		Red-brown, SILT, trace medium Gravel	
	36	46				
	37	50				
	38	34				
	39	58	S9			
	40	60				
		100%				

# NJTP86-58

## 3.17'

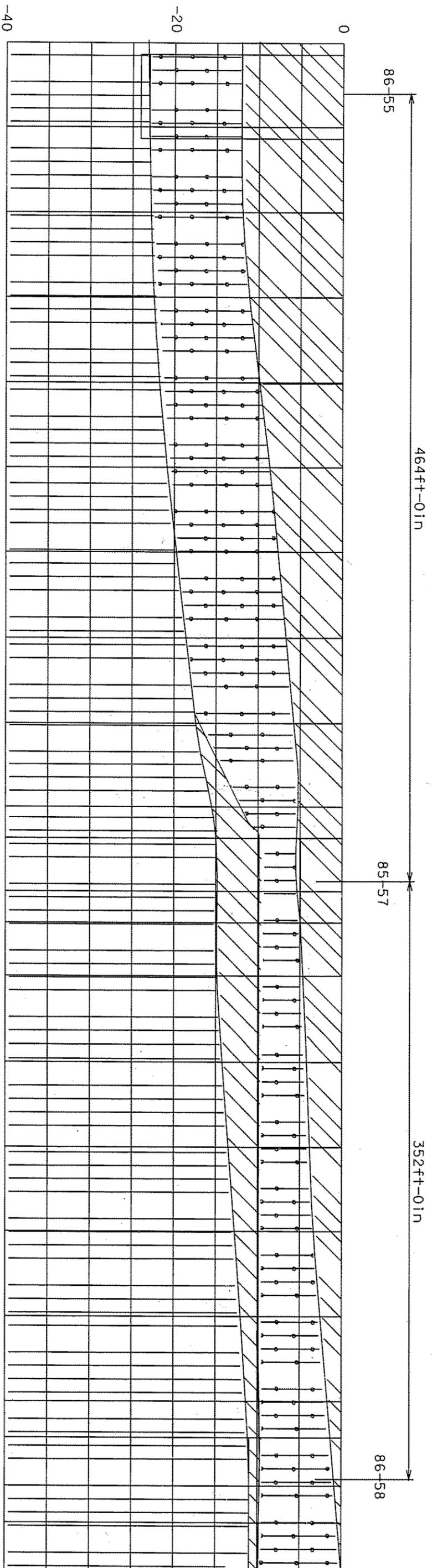
ELEVATION	DEPTH	Soils Sample Interval	LEGEND	CLASSIFICATION OF MATERIALS <i>(Description)</i>	REMARKS
0	1	0-1	S1	Brown, SAND, some brown Silt, little coarse Gravel	trace Roots $\nabla$ 3'
	2	1-2			
	3	2-3			
	4	3-4			
	5	4-5			
	6	5-6	S2	Coarse-medium GRAVEL, trace brown Sand	
	7	6-7			
-5	8	7-8			
	9	8-9			
	10	9-10			
	11	10-11	S3	Brown, SAND, little medium- fine Gravel	
	12	11-12		Gray SILT	
-10	13	12-13		Mottled red-gray SILT, some medium-fine Gravel	
	14	13-14			
	15	14-15			
	16	15-16	S4	Red-brown, SILT and brown SAND, some medium-coarse Gravel	
-15	17	16-17			
	18	17-18			
	19	18-19			
	20	19-20			
	21	20-21	S5	Red-brown, SILT and SAND, some fine-medium Gravel, trace Stones	
-20	22	21-22			
	23	22-23			
	24	23-24			
	25	24-25			
	26	25-26	S6	Red-brown, SILT, some fine- medium Sand, little medium-fine Gravel, Stones	
-25	27	26-27			
	28	27-28			
	29	28-29			
	30	29-30			
	31	30-31	S7	Red-brown, SILT and SAND, little coarse Gravel	
-30	32	31-32		Red-brown, SILT and medium- fine Sand	
	33	32-33			
	34	33-34			
	35	34-35			
	36	35-36	S8	Red-brown, SILT and SAND, some coarse Gravel, trace Serpentine	
	37	36-37			
-35	38	37-38			
	39	38-39	S9	Red-brown, SILT and SAND, some medium-coarse Gravel, trace Rock fragments	
	40	39-40			
	41	40-41			
	42	41-42			
-40	43	42-43		Red-brown, SILT and SAND, some medium-coarse Gravel, little decomp. Serpentine, trace red-brown Shale fragments	
	44	43-44			
	45	44-45			
	46	45-46			

# NJTP 86-59

## 2.49'

ELEVATION	DEPTH	SOIL SAMPLE NUMBER	LEGEND	CLASSIFICATION OF MATERIALS <i>(Observation)</i>	REMARKS
0	1	S1		Brown-gray, SILT	trace Roots
	2				
	3				
-5	4	S2		Brown, fine SAND, little Silt	little roots ∇ 5'
	5				
	6				
-10	7	S3		Red-brown, SAND and SILT	
	8				
	9				
-15	10	S4		Red-brown, medium-fine SAND, little Silt	
	11				
	12				
-20	13	S5		Red-brown, medium-fine SAND, trace Silt	
	14				
	15				
-25	16	S6		Red-brown, medium-fine SAND, trace Silt, trace Gravel	
	17				
	18				
-30	19	S7		Red-brown, medium-fine SAND, little Silt	
	20				
	21				
-35	22	S8		Red-brown, fine SAND, some Silt	
	23				
	24				
-40	25	S9		Red-brown, fine SAND, trace Silt	
	26				
	27				
-45	28	S10		Red-brown, coarse SAND	
	29				
	30				
-50	31	S11			
	32				
	33				
-55	34	S12			
	35				
	36				
-60	37				
	38				
	39				
-65	40				

CROSS-SECTION OF BORINGS  
NJTP 85-55, 85-57, AND 85-58



SEE TURNPIKE AUTHORITY MAP FOR LOCATION OF CROSS-SECTION



