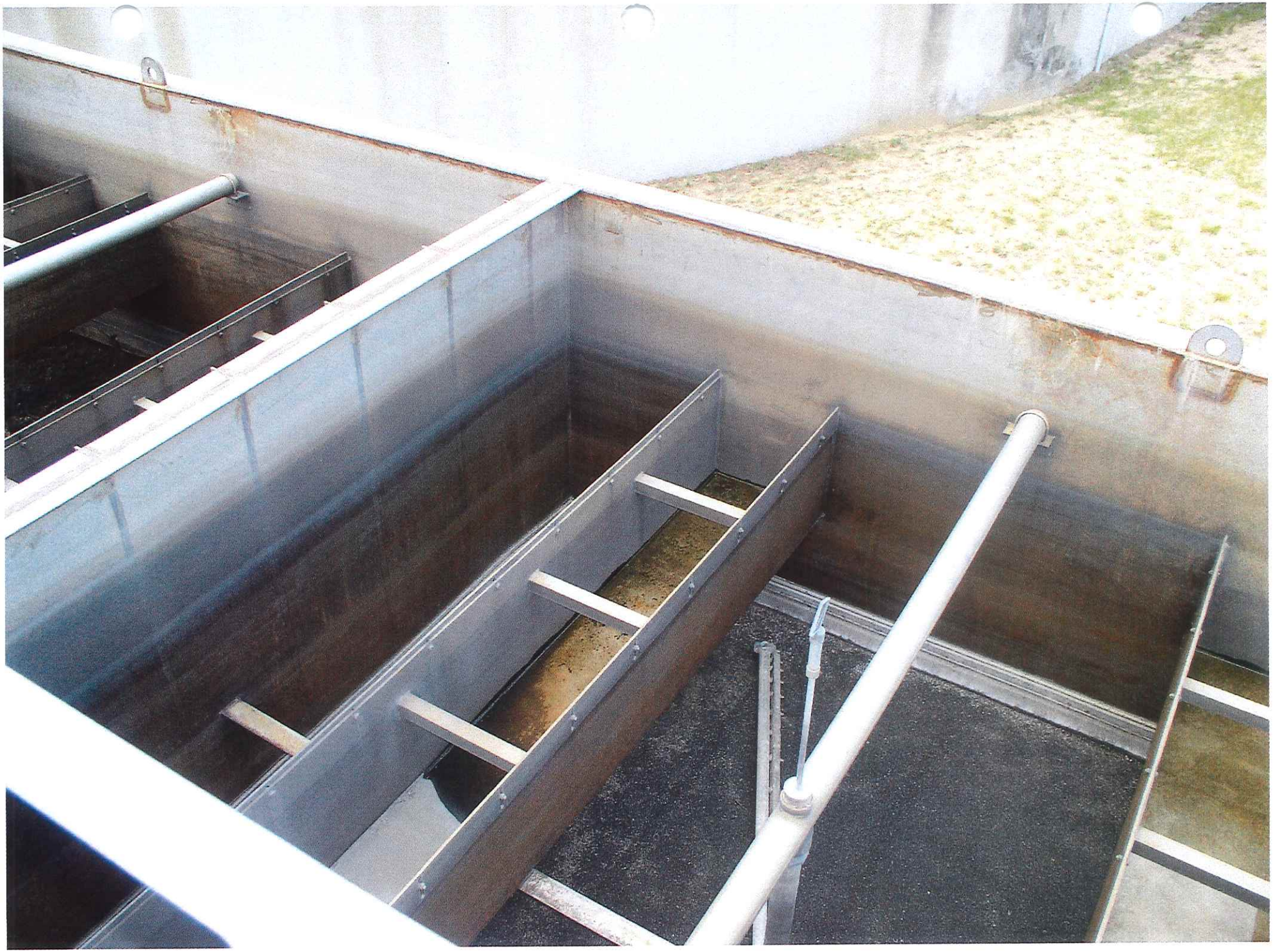
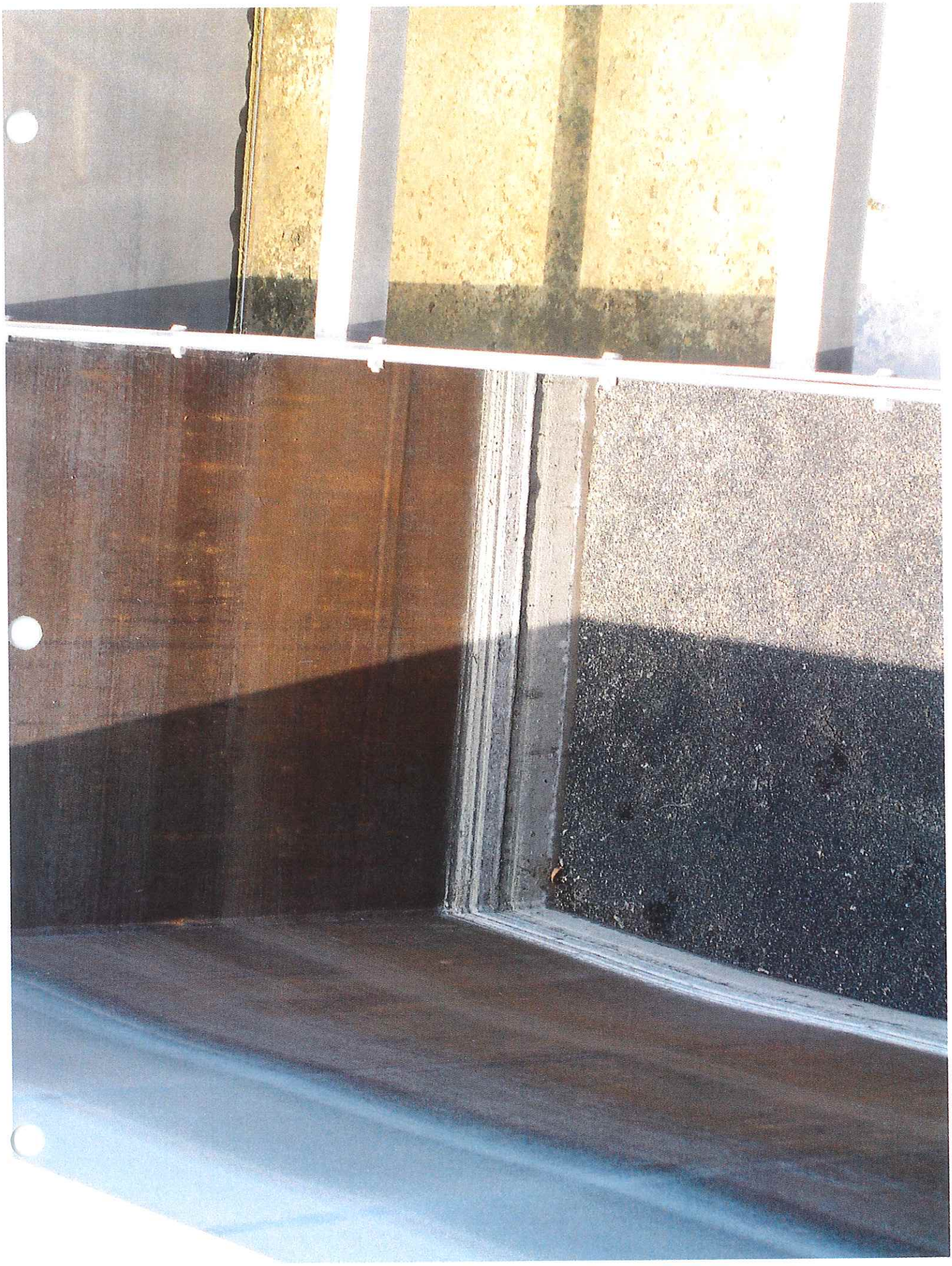
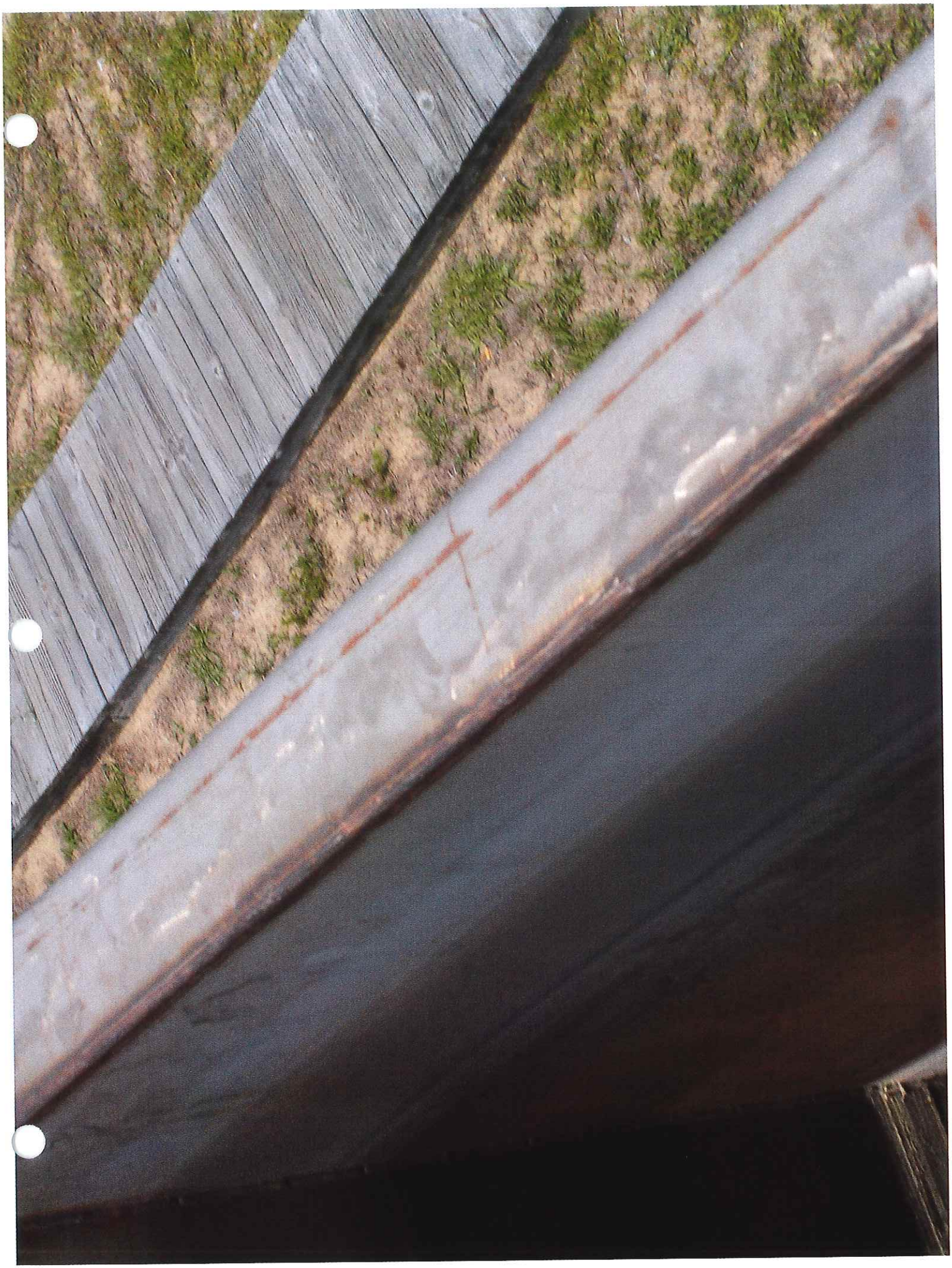
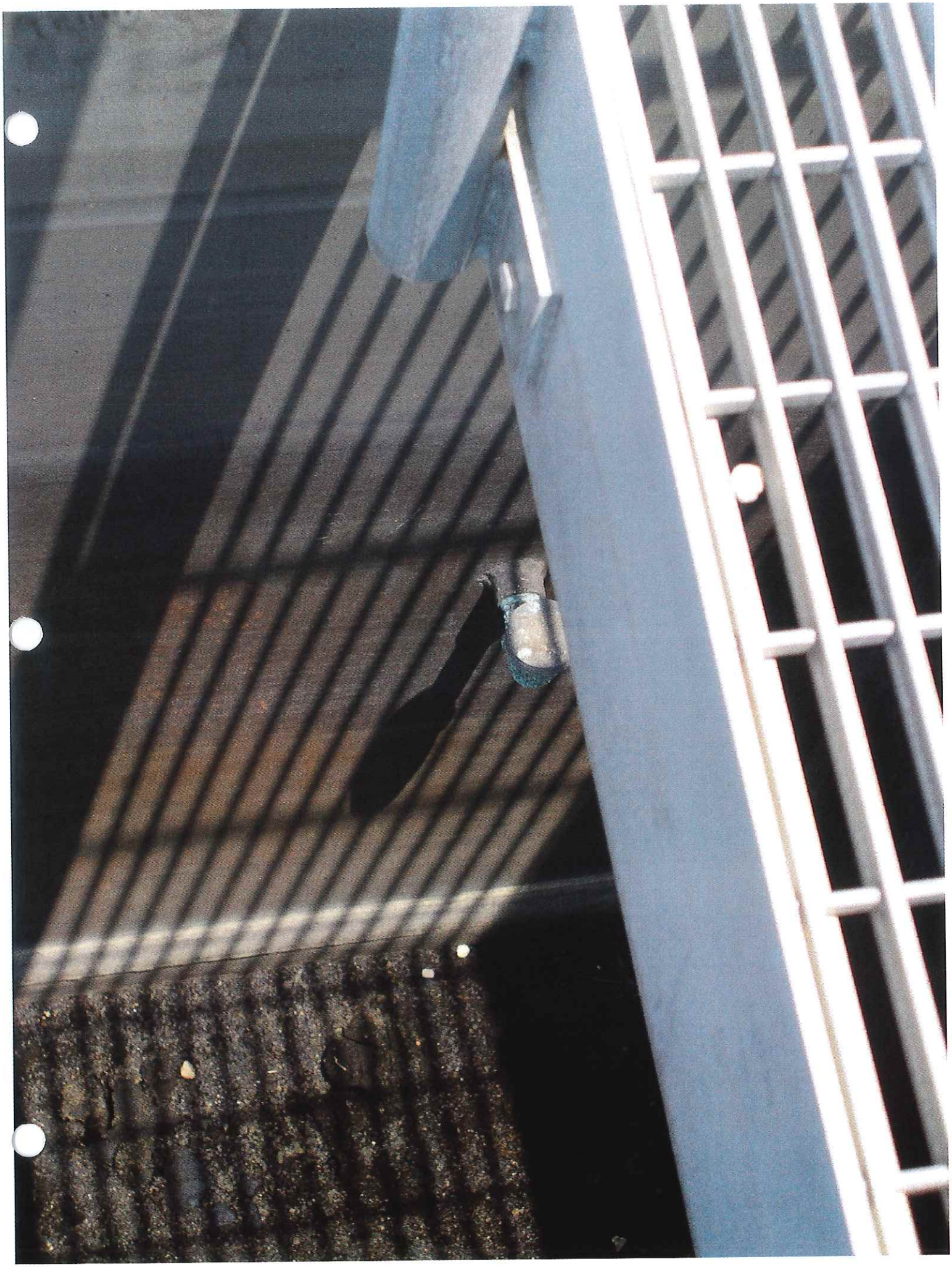


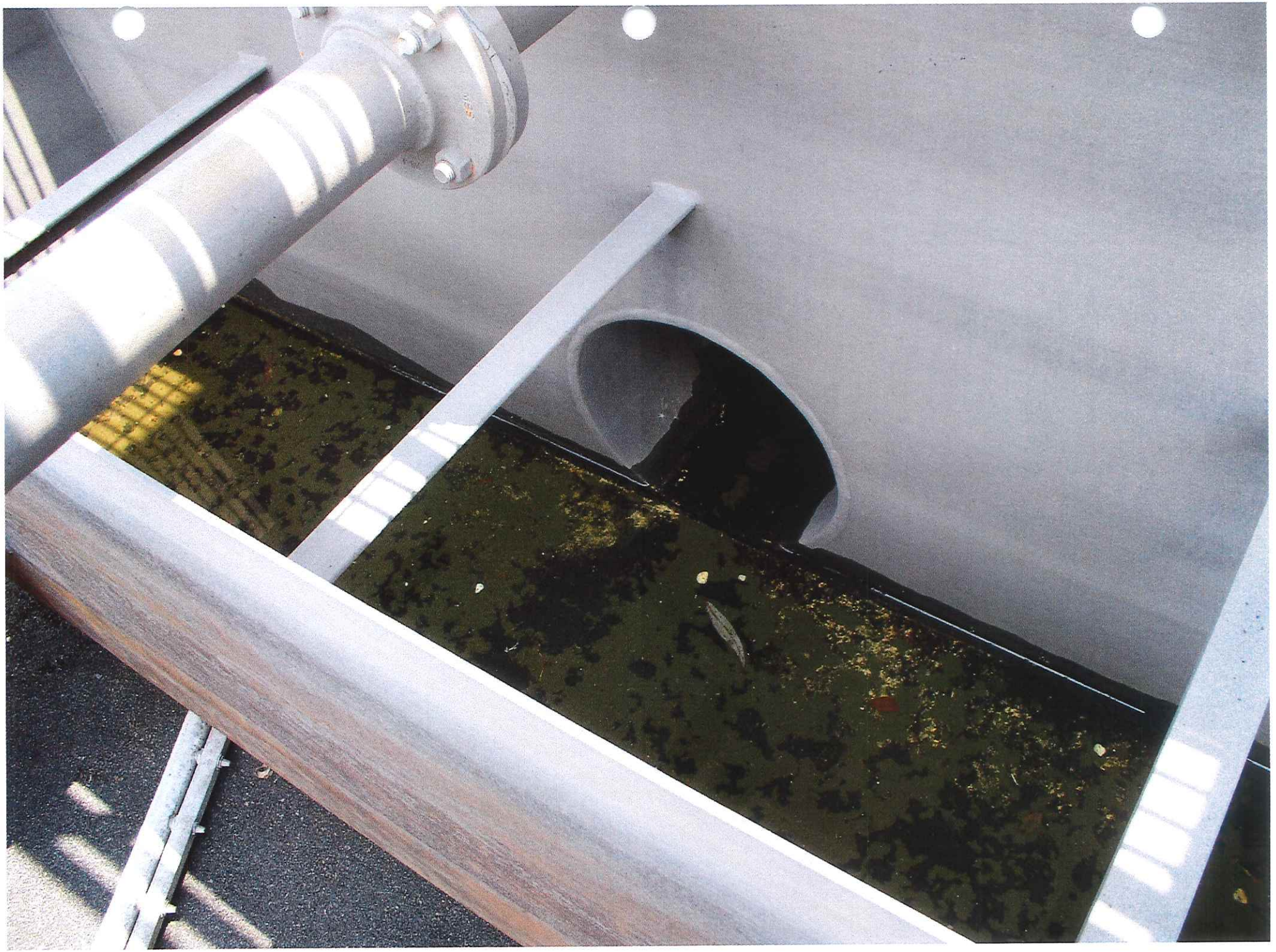

ROTOSWEEP

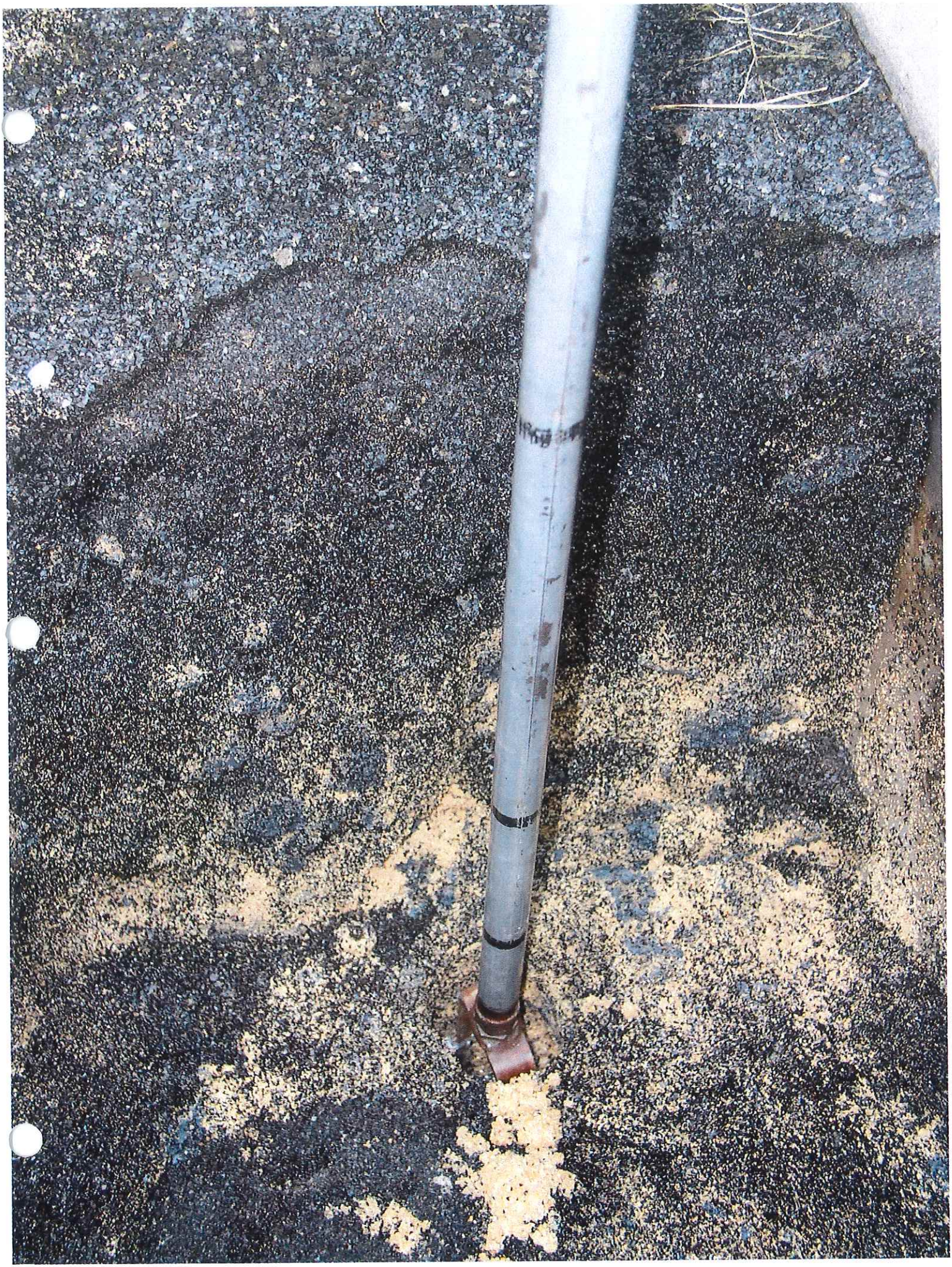

ROBERTS
GARNER, TX











Appendix B – Filter Media Sieve Analysis Results

Sieve Analysis of Fine and Coarse Aggregates

S&ME

S&ME Project #:	**1053-06-278**	Report Date:	6/20/06
Project Name:	**Nags Head Fresh Pond Water Treatment Plant**	Test Date(s):	6/16 - 6/20/06
Client Name:	The Wooten Company		
Client Address:	120 North Boylan Avenue, Raleigh, NC 27603		

Boring #:	Cell #1	Sample #:	1	Sample Date:	6/15/06
Location:	Project Site			Elevation:	NA
Sample Description:	Anthracite Media				

Sieve Size (mm)	Sieve Size	% Retained Total Sample	% Retained Between Sieves	Percent Passing Total Sample	Specifications
19.00	3/4"	0.0%	0.0%	100.0%	
12.50	1/2"	0.0%	0.0%	100.0%	
9.50	3/8"	0.0%	0.0%	100.0%	
4.75	#4	0.0%	0.0%	100.0%	
2.80	#7	0.0%	0.0%	100.0%	
2.36	#8	0.2%	0.2%	99.8%	
1.18	#16	41.7%	41.5%	58.3%	
0.600	#30	76.7%	35.0%	23.3%	
0.425	#40	93.4%	16.7%	6.6%	
0.300	#50	99.4%	6.0%	0.6%	
0.150	#100	99.8%	0.4%	0.2%	
0.075	#200	100.0%	0.2%	0.0%	

Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#7	Coarse Sand	41.5%	Fine Sand	6.6%
Gravel	0.2%	Medium Sand	51.7%	Silt & Clay	0.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Relative Density SSD	ND				
ND=Not Determined					

Fineness Modulus	ND	Cu: 2.9	Cc: 0.7

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates
ASTM D75: Practice for Sampling Aggregates
ASTM C 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing
ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility: Mal Krajan — Signature — Laboratory Supervosor — Position

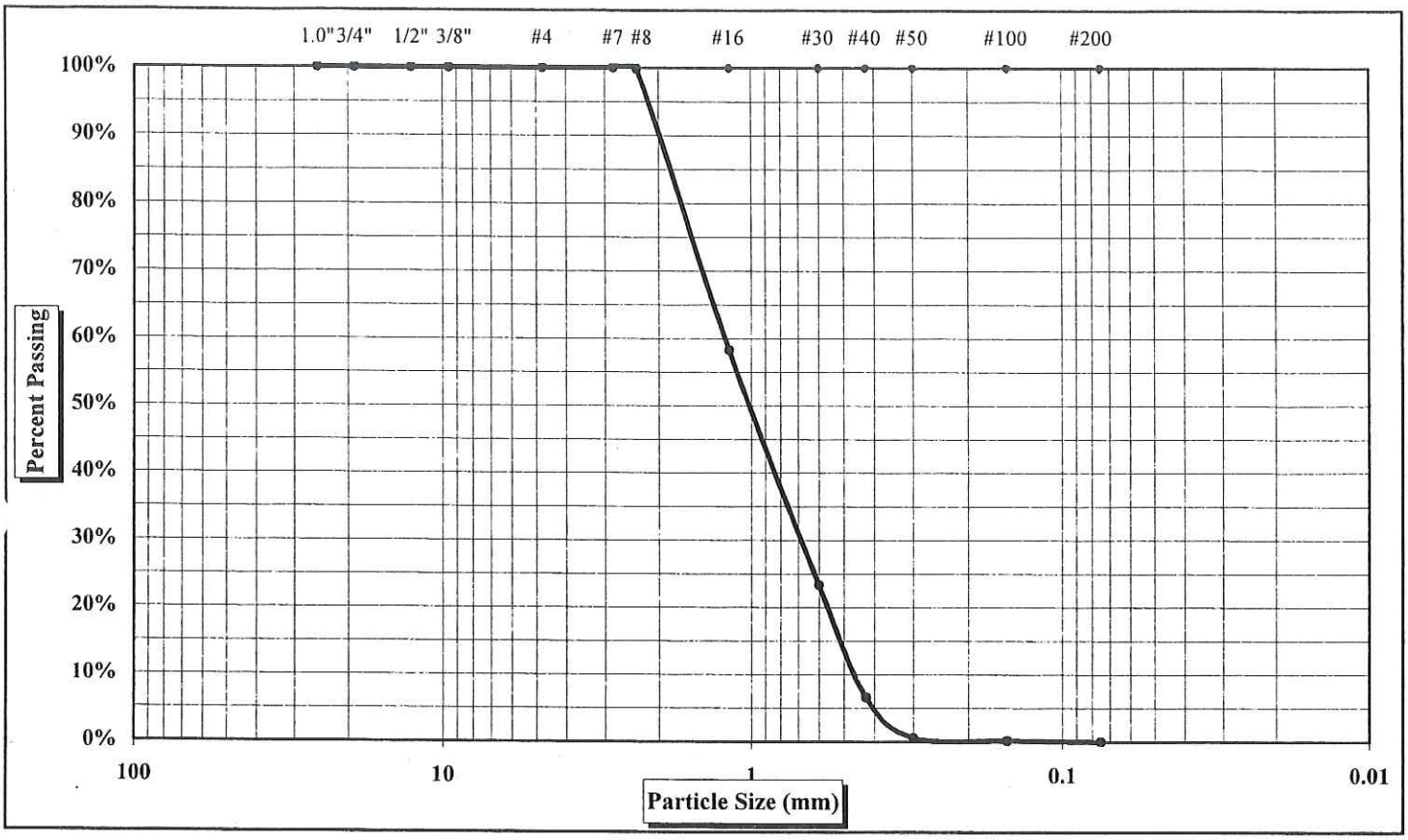
Sieve Analysis of Fine and Coarse Aggregates

ASTM C 136

S&ME

S&ME Project #:	**1053-06-278**	Report Date:	6/20/06
Project Name:	**Nags Head Fresh Pond Water Treatment Plant**	Test Date(s):	6/16 - 6/20/06
Client Name:	The Wooten Company		
Client Address:	120 North Boylan Avenue, Raleigh, NC 27603		

Boring #:	Cell #1	Sample #:	1	Sample Date:	6/15/06
Location:	Project Site			Elevation:	NA
Sample Description:	Anthracite Media				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#7	Coarse Sand	41.5%	Fine Sand	6.6%
Gravel	0.2%	Medium Sand	51.7%	Silt & Clay	0.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Relative Density SSD	ND				
ND=Not Determined					

Fineness Modulus ND Cu: 2.9 Cc: 0.7

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates
ASTM D75: Practice for Sampling Aggregates
117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing
ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility: Mal Krajan — Signature — Laboratory Supervosor — Position

Sieve Analysis of Fine and Coarse Aggregates

S&ME

&ME Project #:	**1053-06-278**	Report Date:	6/20/06
roject Name:	**Nags Head Fresh Pond Water Treatment Plant**	Test Date(s):	6/16 - 6/20/06
Client Name:	The Wooten Company		
Client Address:	120 North Boylan Avenue, Raleigh, NC 27603		

Boring #:	Cell #2	Sample #:	2	Sample Date:	6/15/06
Location:	Project Site			Elevation:	NA
Sample Description:	Anthracite Media				

Sieve Size (mm)	Sieve Size	% Retained Total Sample	% Retained Between Sieves	Percent Passing Total Sample	Specifications
19.00	3/4"	0.0%	0.0%	100.0%	
12.50	1/2"	0.0%	0.0%	100.0%	
9.50	3/8"	0.0%	0.0%	100.0%	
4.75	#4	0.0%	0.0%	100.0%	
2.80	#7	0.0%	0.0%	100.0%	
2.36	#8	0.1%	0.1%	99.9%	
1.18	#16	51.1%	51.0%	48.9%	
0.600	#30	85.9%	34.8%	14.1%	
0.425	#40	92.2%	6.3%	7.8%	
0.300	#50	99.6%	7.4%	0.4%	
0.150	#100	99.9%	0.3%	0.1%	
0.075	#200	100.0%	0.1%	0.0%	

Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#7	Coarse Sand	51.0%	Fine Sand	7.8%
Gravel	0.1%	Medium Sand	41.1%	Silt & Clay	0.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Relative Density SSD	ND				
ND=Not Determined					

Fineness Modulus	ND	Cu:	3.0	Cc:	1.0

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates
' 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D75: Practice for Sampling Aggregates
ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

Technical Responsibility: Mal Krajan — Signature — Laboratory Supervosor — Position

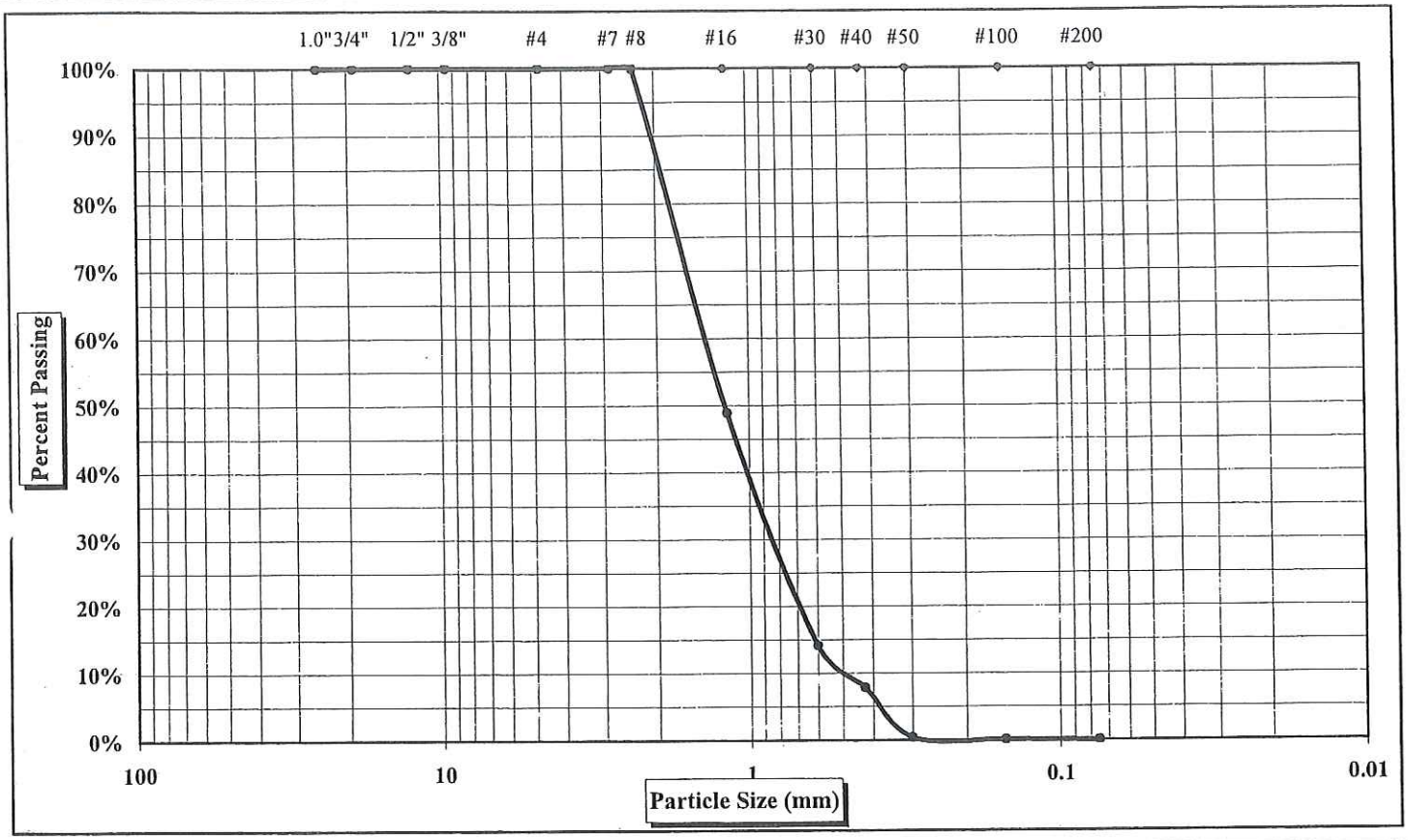
Sieve Analysis of Fine and Coarse Aggregates

ASTM C 136

S&ME

S&ME Project #:	**1053-06-278**	Report Date:	6/20/06
Project Name:	**Nags Head Fresh Pond Water Treatment Plant**	Test Date(s):	6/16 - 6/20/06
Client Name:	The Wooten Company		
Client Address:	120 North Boylan Avenue, Raleigh, NC 27603		

Boring #:	Cell #2	Sample #:	2	Sample Date:	6/15/06
Location:	Project Site			Elevation:	NA
Sample Description:	Anthracite Media				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#7	Coarse Sand	51.0%	Fine Sand	7.8%
Gravel	0.1%	Medium Sand	41.1%	Silt & Clay	0.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Relative Density SSD	ND				

Fineness Modulus ND Cu: 3.0 Cc: 1.0

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates
ASTM D75: Practice for Sampling Aggregates
. 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing
ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility: Mal Krajan Signature Laboratory Supervosor Position

Laboratory Worksheet Version 4.2

Sieve Analysis of Fine and Coarse Aggregates

S&ME

S&ME Project #: **1053-06-278**
Project Name: **Nags Head Fresh Pond Water Treatment Plant**
Client Name: The Wooten Company
Client Address: 120 North Boylan Avenue, Raleigh, NC 27603

Report Date: 6/20/06
Test Date(s): 6/16 - 6/20/06

Boring #:	Cell #1	Sample #:	1	Sample Date:	6/15/06
Location:	Project Site			Elevation:	NA
Sample Description:	Sand				

Sieve Size (mm)	Sieve Size	% Retained Total Sample	% Retained Between Sieves	Percent Passing Total Sample	Specifications
19.00	3/4"	0.0%	0.0%	100.0%	
12.50	1/2"	0.0%	0.0%	100.0%	
9.50	3/8"	0.0%	0.0%	100.0%	
4.75	#4	0.0%	0.0%	100.0%	
2.80	#7	0.1%	0.1%	99.9%	
2.36	#8	0.3%	0.2%	99.7%	
1.18	#16	32.6%	32.3%	67.4%	
0.600	#30	92.1%	59.5%	7.9%	
0.425	#40	99.0%	6.9%	1.0%	
0.300	#50	99.7%	0.7%	0.3%	
0.150	#100	99.9%	0.2%	0.1%	
0.075	#200	99.9%	0.0%	0.1%	

Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	32.3%	Fine Sand	0.9%
Gravel	0.3%	Medium Sand	66.4%	Silt & Clay	0.1%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Relative Density SSD	ND				
ND=Not Determined					

Fineness Modulus ND Cu: 1.8 Cc: 0.9

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates
ASTM D75: Practice for Sampling Aggregates
117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing
ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility: Mal Krajan — Signature — Laboratory Supervosor — Position

S&ME,INC. **3109 Spring Forest Road, Raleigh, NC. 27616** **Cell #1 Sand**

Laboratory Worksheet Version 4.2

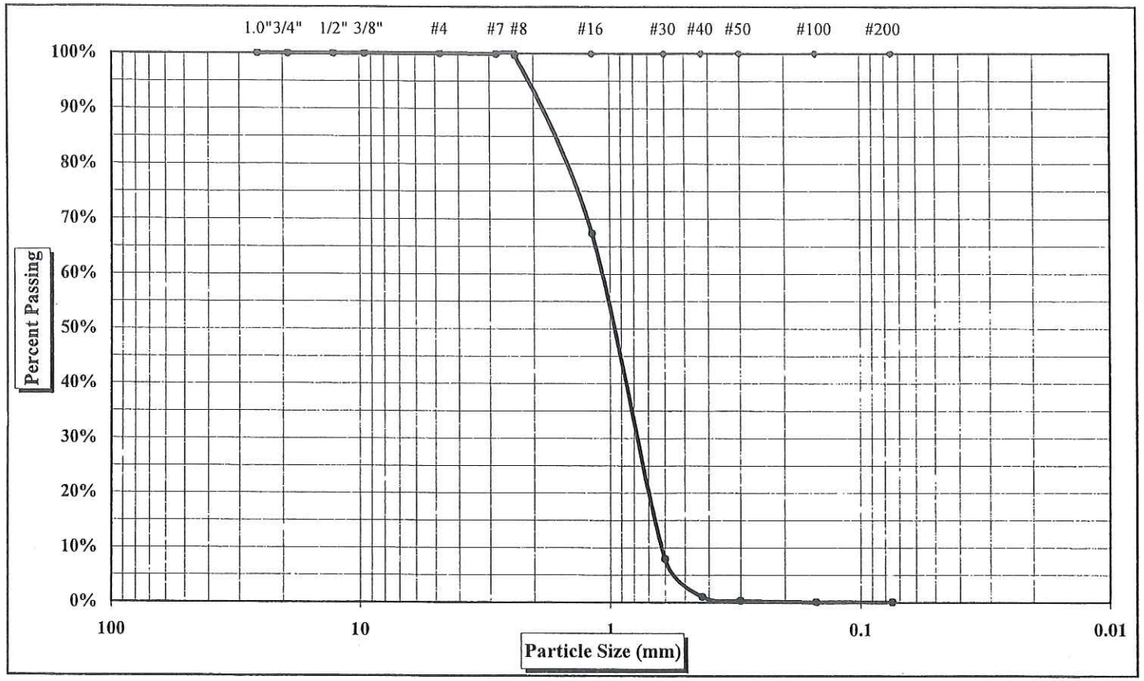
Sieve Analysis of Fine and Coarse Aggregates

ASTM C 136

S&ME

S&ME Project #:	**1053-06-278**	Report Date:	6/20/06
Project Name:	**Nags Head Fresh Pond Water Treatment Plant**	Test Date(s):	6/16 - 6/20/06
Client Name:	The Wooten Company		
Client Address:	120 North Boylan Avenue, Raleigh, NC 27603		

Boring #:	Cell #1	Sample #:	1	Sample Date:	6/15/06
Location:	Project Site			Elevation:	NA
Sample Description:	Sand				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	32.3%	Fine Sand	0.9%
Gravel	0.3%	Medium Sand	66.4%	Silt & Clay	0.1%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Relative Density SSD	ND				

ND=Not Determined

Fineness Modulus ND Cu: 1.8 Cc: 0.9

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates ASTM D75: Practice for Sampling Aggregates

ASTM C 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility: Mal Krajan *Signature* Laboratory Supervosor *Position*

Laboratory Worksheet Version 4.2

Sieve Analysis of Fine and Coarse Aggregates

S&ME

S&ME Project #:	**1053-06-278**	Report Date:	6/20/06
Project Name:	**Nags Head Fresh Pond Water Treatment Plant**	Test Date(s):	6/16 - 6/20/06
Client Name:	The Wooten Company		
Client Address:	120 North Boylan Avenue, Raleigh, NC 27603		

Boring #:	Cell #2	Sample #:	2	Sample Date:	6/15/06
Location:	Project Site			Elevation:	NA
Sample Description:	Sand				

Sieve Size (mm)	Sieve Size	% Retained Total Sample	% Retained Between Sieves	Percent Passing Total Sample	Specifications
19.00	3/4"	0.0%	0.0%	100.0%	
12.50	1/2"	0.0%	0.0%	100.0%	
9.50	3/8"	0.0%	0.0%	100.0%	
4.75	#4	0.0%	0.0%	100.0%	
2.80	#7	1.0%	1.0%	99.0%	
2.36	#8	1.3%	0.3%	98.7%	
1.18	#16	29.0%	27.7%	71.0%	
0.600	#30	77.3%	48.3%	22.7%	
0.425	#40	97.8%	20.5%	2.2%	
0.300	#50	99.6%	1.8%	0.4%	
0.150	#100	99.9%	0.3%	0.1%	
0.075	#200	100.0%	0.1%	0.0%	

Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	27.7%	Fine Sand	2.2%
Gravel	1.3%	Medium Sand	68.8%	Silt & Clay	0.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Relative Density SSD	ND				

ND=Not Determined

Fineness Modulus ND Cu: 2.0 Cc: 0.9

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates
ASTM D75: Practice for Sampling Aggregates
ASTM C 117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing
ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility: Mal Krajan — Signature — Laboratory Supervosor — Position

S&ME,INC. **3109 Spring Forest Road, Raleigh, NC. 27616** **Cell #2 Sand**

Laboratory Worksheet Version 4.2

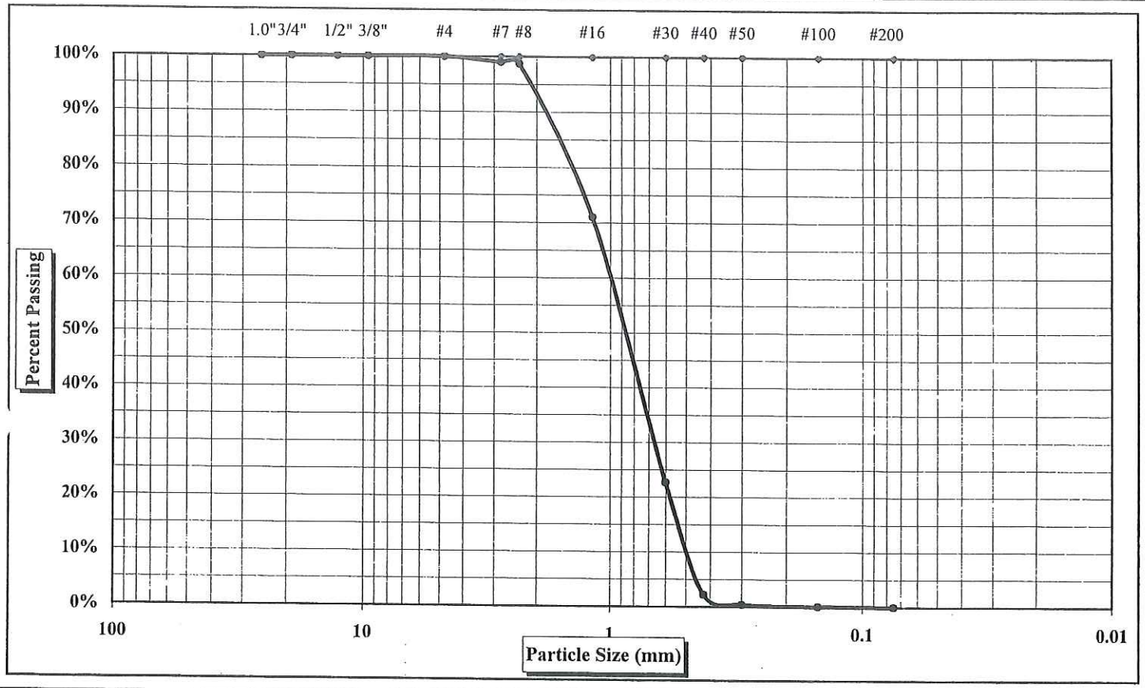
Sieve Analysis of Fine and Coarse Aggregates

ASTM C 136

S&ME

S&ME Project #:	**1053-06-278**	Report Date:	6/20/06
Project Name:	**Nags Head Fresh Pond Water Treatment Plant**	Test Date(s):	6/16 - 6/20/06
Client Name:	The Wooten Company		
Client Address:	120 North Boylan Avenue, Raleigh, NC 27603		

Boring #:	Cell #2	Sample #:	2	Sample Date:	6/15/06
Location:	Project Site			Elevation:	NA
Sample Description:	Sand				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#4	Coarse Sand	27.7%	Fine Sand	2.2%
Gravel	1.3%	Medium Sand	68.8%	Silt & Clay	0.0%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Relative Density SSD	ND				
ND=Not Determined					

Fineness Modulus ND Cu: 2.0 Cc: 0.9

References: ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates
117: Material Finer than the #200 Sieve in Mineral Aggregates by Washing
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D75: Practice for Sampling Aggregates
ASTM C702: Practice for Reducing Samples of Aggregate to Testing Size

Technical Responsibility: Mal Krajan *Signature* Laboratory Supervosor *Position*

S&ME,INC. 3109 Spring Forest Road, Raleigh, NC. 27616 Cell #2 Sand

Appendix C – Preliminary Recommendations

Vance Brooks

From: Vance Brooks [vbrooks@thewootencompany.com]
Sent: Friday, June 16, 2006 5:29 PM
To: 'Nancy Carawan'
Cc: 'Chris Thomson'; 'Fred hill'; 'David Tawes'
Subject: Nags Head Fresh Pond WTP - Filter Assessment - TWC # 2977-A

Nancy

We enjoyed meeting with you yesterday. As discussed, following below are some preliminary observations from our field investigation.

- Before placing the plant in service:
  - Remove trash, particularly roof gravel, from the filter troughs.
  - Remove mud balls from anthracite along the west side of Filter Cell No. 1. Do not disturb the filter sand.
  - Remove mud balls from anthracite along the south side of Filter Cell No. 2. Do not disturb the filter sand.
  - It is estimated that no more than 110 CF of anthracite will have to be removed. Actually, much less than this should end up being taken out.
  - Re-level the filter surface.
  - Disinfect the filters.
- During the plant field trials to be conducted prior to placing the plant on-line:
    - Check the proper operation of the filter surface sweeps.
    - Are they spinning properly?
    - What is the flow rate?
    - Are water and air coming from all of the nozzles, especially the end nozzles?
  - What is the filter backwash rate? It should be on the order of 15-20 gpm/sf. This translates to 2,160 to 2,880 gpm per filter.
- As soon as it can be obtained, replace the anthracite removed above. The anthracite, based on the old MGA specification for this project, should have the following characteristics: effective size of 1.0 mm and uniformity coefficient of about 1.4. Note that the lead time on purchasing anthracite is six months or more. We are in the process of making calls now to see if any is available for immediate delivery. We will be back in touch when we have more information.

The above procedures were discussed with you in the field yesterday. Mr. David Tawes with N. C. Public Water Supply was present and concurred. Also, the above was discussed in detail with Mr. Fred Hill of N. C. Public Water Supply today. He also concurred. Should you have any questions concerning this, please do not hesitate to contact our office and/or N. C. Public Water Supply for further confirmation.

We will provide you with a full, final report on our filter assessment once we receive the sieve analyses on the filter media samples taken. This full report will include the preliminary recommendations noted above.

Also, Chris Thomson with our office will be at your plant for jar testing assistance on June 28 and 29, per our discussion. We believe that Mr. Tawes also plans to be present.

Thanks,

C. V. Brooks, IV, PE, PLS
(Vance Brooks)

6/16/2006

Water Resources Manager
The Wooten Company
Raleigh, North Carolina
(919)828-0531

PRELIMINARY – DO NOT USE FOR CONSTRUCTION