

N61165.AR.005104
CNC CHARLESTON
5090.3a

COMPLETION REPORT FOR TANK P AND PUMP ROOM AT CHICORA TANK FARM CNC
CHARLESTON SC
04/16/1999
ENVIRONMENTAL DETACHMENT CHARLESTON

Li 5.4.99
L05.11.99

RECEIVED

APR 16 1999

Water Monitoring, Assessment & Protection Division

**COMPLETION REPORT FOR TANK P
AND PUMP ROOM AT
CHICORA TANK FARM IN
NORTH CHARLESTON, S.C.**



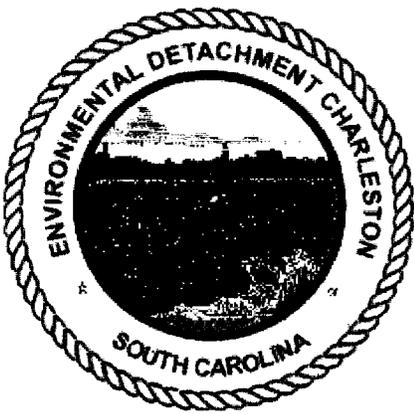
Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING
COMMAND
CHARLESTON, S.C.



Prepared by:

ENVIRONMENTAL DETACHMENT
CHARLESTON
1899 NORTH HOBSON AVE.
NORTH CHARLESTON, S.C. 29405-2106



April 1999

TANK "P" CLOSURE

1.0 SITE DESCRIPTION

The Chicora Tank Farm (CTF) is located in North Charleston approximately ½ mile west of the Charleston Naval Base (NAVBASE). Tank "P" was a 2.1 million gallon field constructed cut-and-cover tank on this site of approximately 24 acres. CTF is bounded by Carner Avenue on the west, Chicora Avenue on the east, Clements Ferry Road to the south, and a marshland area to the north. The Norman C. Toole Magnet School abuts the property to the northwest and is north of tank "P". The site appears to be rolling pasture land. Tank "P" had an adjacent pump room containing piping and pumps for moving fuel to the NAVBASE.

2.0 TANK/PUMP ROOM DESCRIPTION

Tank "P" was constructed around 1942 as a cut-and-cover underground storage tank and was not regulated. The tank was designed to contain Bunker C and was later used to contain diesel fuel. Tank "P" was approximately 138.5 feet in diameter, 20 foot inside height with 52 concrete supporting columns, and with 4 to 5 feet of soil over the top of the tank. The adjacent pump room was approximately 24 feet x 24 feet x 25 feet high and the top was under approximately seven feet of soil. The tank and pump room were poured-in-place concrete structures reinforced with steel rebar. The tank top was at an elevation approximately 20 feet above means sea level. The pump room top was about three feet lower than the tank.

3.0 SCOPE OF WORK

The statement of work for the project, # 97027, required South Carolina Department of Health and Environmental Control (SCDHEC) approval of the comprehensive work plan prior to any work on site (See Appendix A).

The pump room was opened, stripped of all pumps, motors, piping, and other equipment and cleaned by high pressure washing. Tank "P" was previously cleaned by the Air National Guard Team from South Dakota.

There was a certified safety specialist (CSP) on site during the demolition phase of the project. Heavy demolition equipment was used to crush concrete from the tank and pump room. The lower portion of the walls (eight feet) and the bottom remained intact. The broken concrete was collected in the bottom of the tank and pump room.

Backfill was used to fill the voids from the broken concrete in the bottom of the tank/pump room. The remaining lower portion of the tank/pump room was backfilled and compacted with a vibratory compactor. The tank/pump room site was contoured and sloped to ensure drainage of rain water.

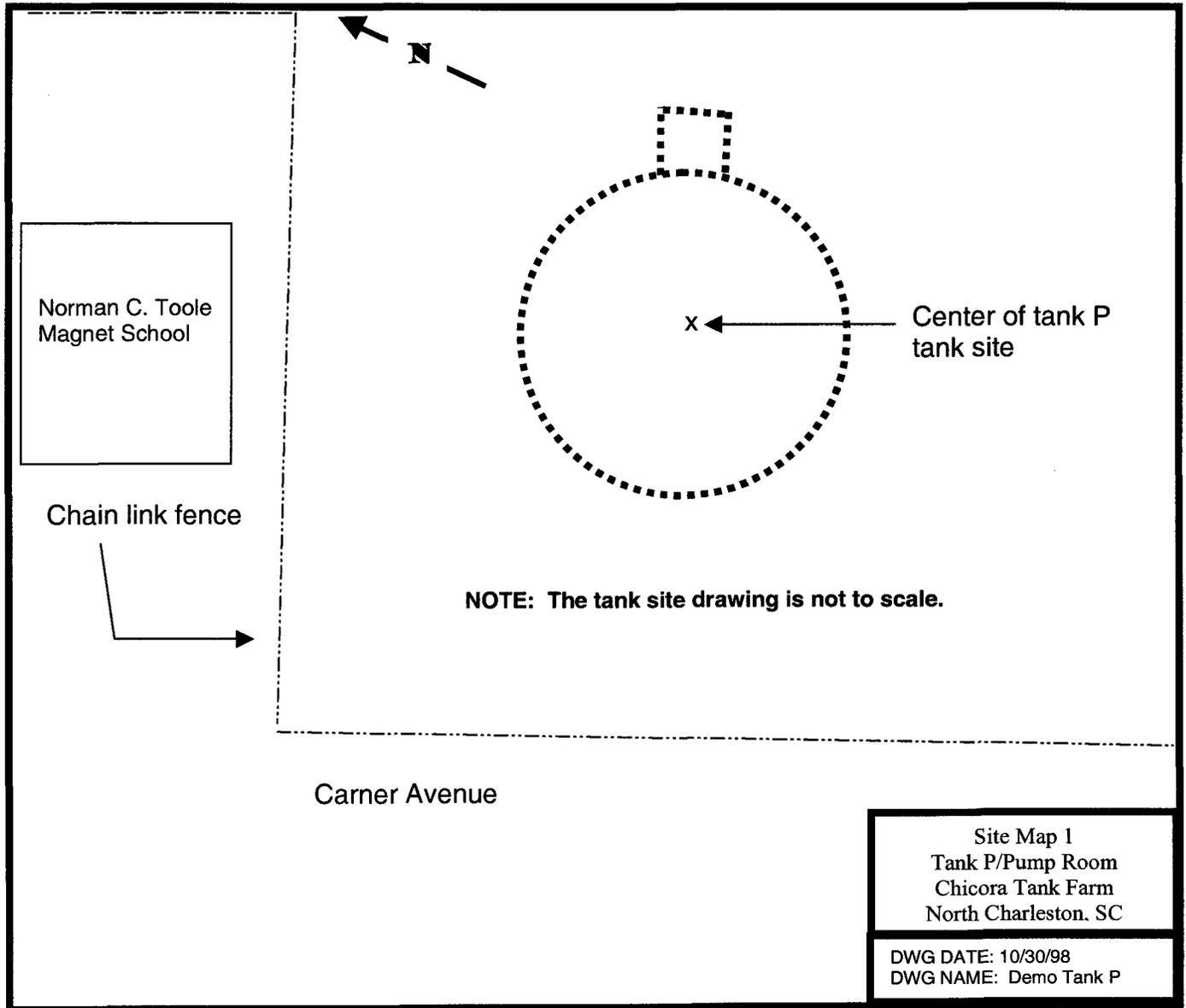
The site was capped with low permeability clay to prevent infiltration of rainwater into the remaining tank bottom. Requirements for the clay were: Permeability of at least 8.0×10^{-7} cm/sec and must pass a modified proctor dry density test (ASTM -D1557) and hydraulic conductivity test (ASTM - D5084). See Appendix B for all tests and results. The clay was applied in two eight inch (minimum) lifts. Each lift was compacted using a smooth drum and a sheepsfoot vibratory compactor. Then the site was backfilled with the excavated soil and graded, compacted, and seeded using hydroseed techniques.

4.0 TANK ELEVATIONS

Chicora Tank Farm
Elevations from the Tank "P" Site

Location	Elevation	Date surveyed
1. center of the original tank top	20.1107'	08-07-98
2. center of tank site under the clay cap	7.5071'	09-08-98
3. center of tank site on top of the clay cap	8.6616'	09-29-98
4. center of tank site after backfilled to finished grade	14.7200'	10-13-98

Note: Survey reference TBM is the railroad spike in the power pole located at the extreme southwest corner of the tank farm with an elevation of 16.31'.

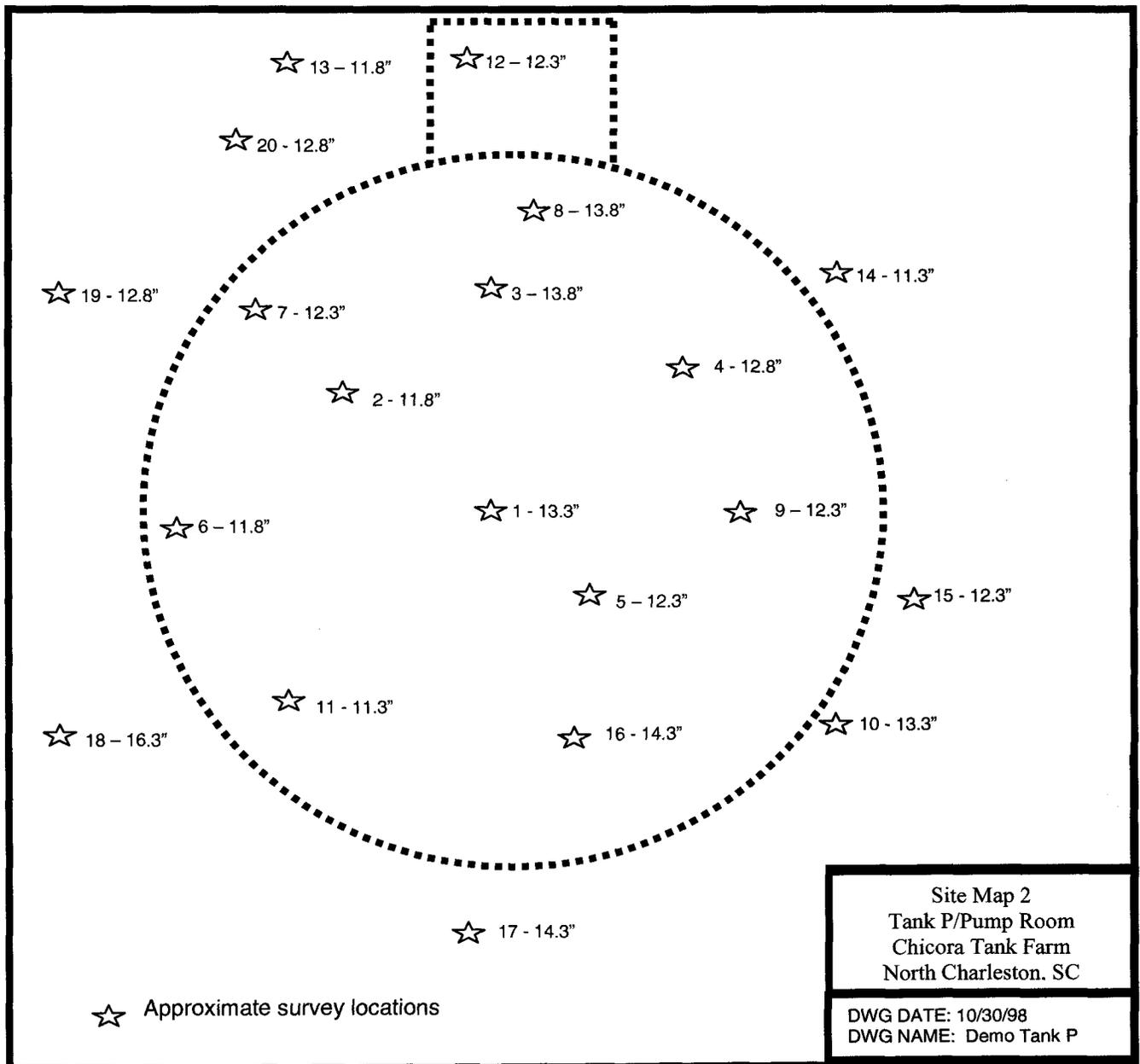


5.0 CLAY CAP THICKNESS

Clay cap material (inches) thickness over the Tank Site

survey point	Thickness (inches)	survey point	Thickness (inches)
1	13.3	11	11.3
2	11.8	12	12.3
3	13.8	13	11.8
4	12.8	14	11.3
5	12.3	15	12.3
6	11.8	16	14.3
7	12.3	17	14.3
8	13.8	18	16.3
9	12.3	19	12.8
10	13.3	20	12.8

NOTE: The clay cap material was applied over the backfilled tank/pump room. The clay cap extended five feet minimum beyond the remaining walls of the tank/pump room.

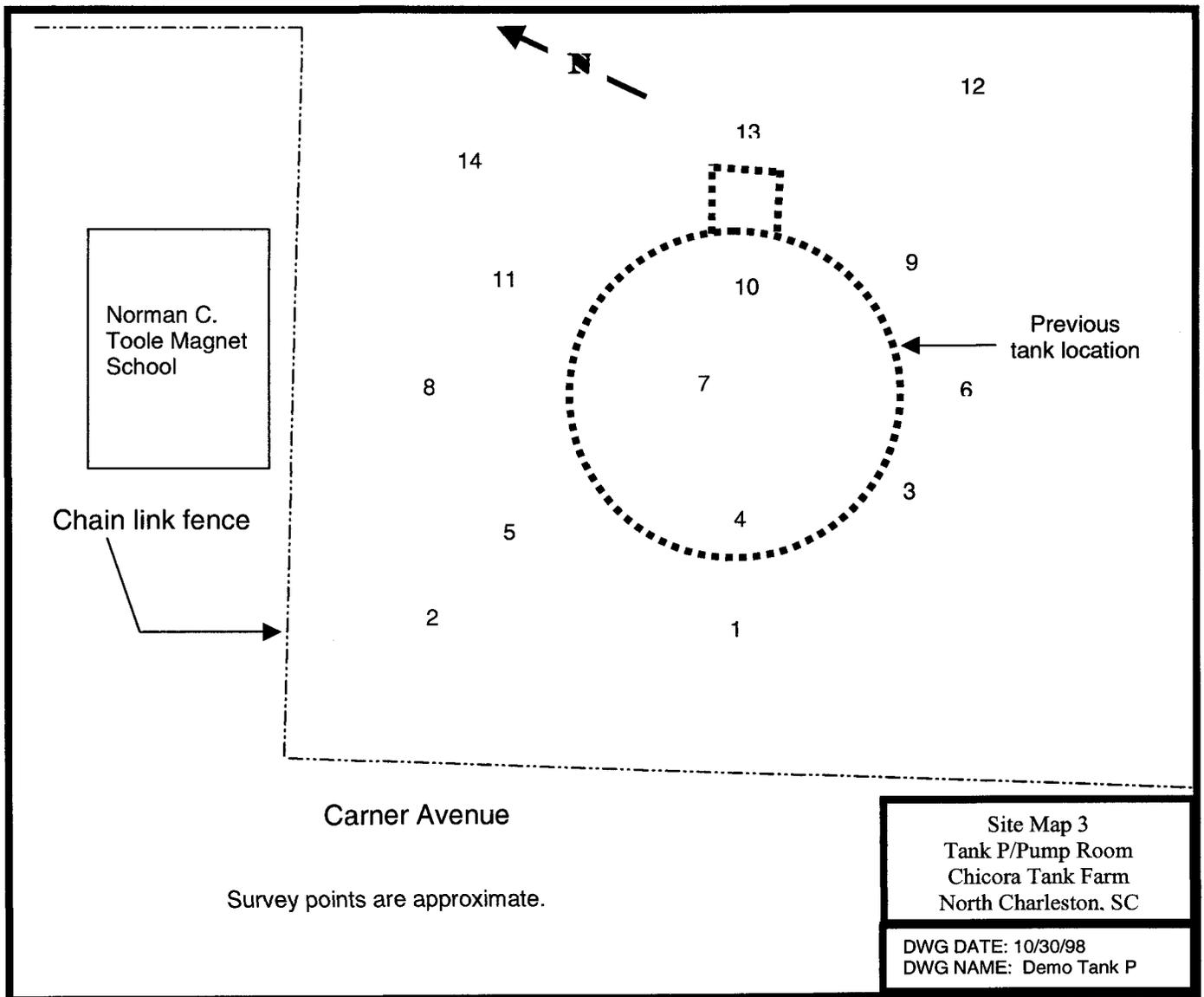


6.0 BACKFILLED ELEVATIONS

Elevations from Tank Site taken
after backfilling and grading

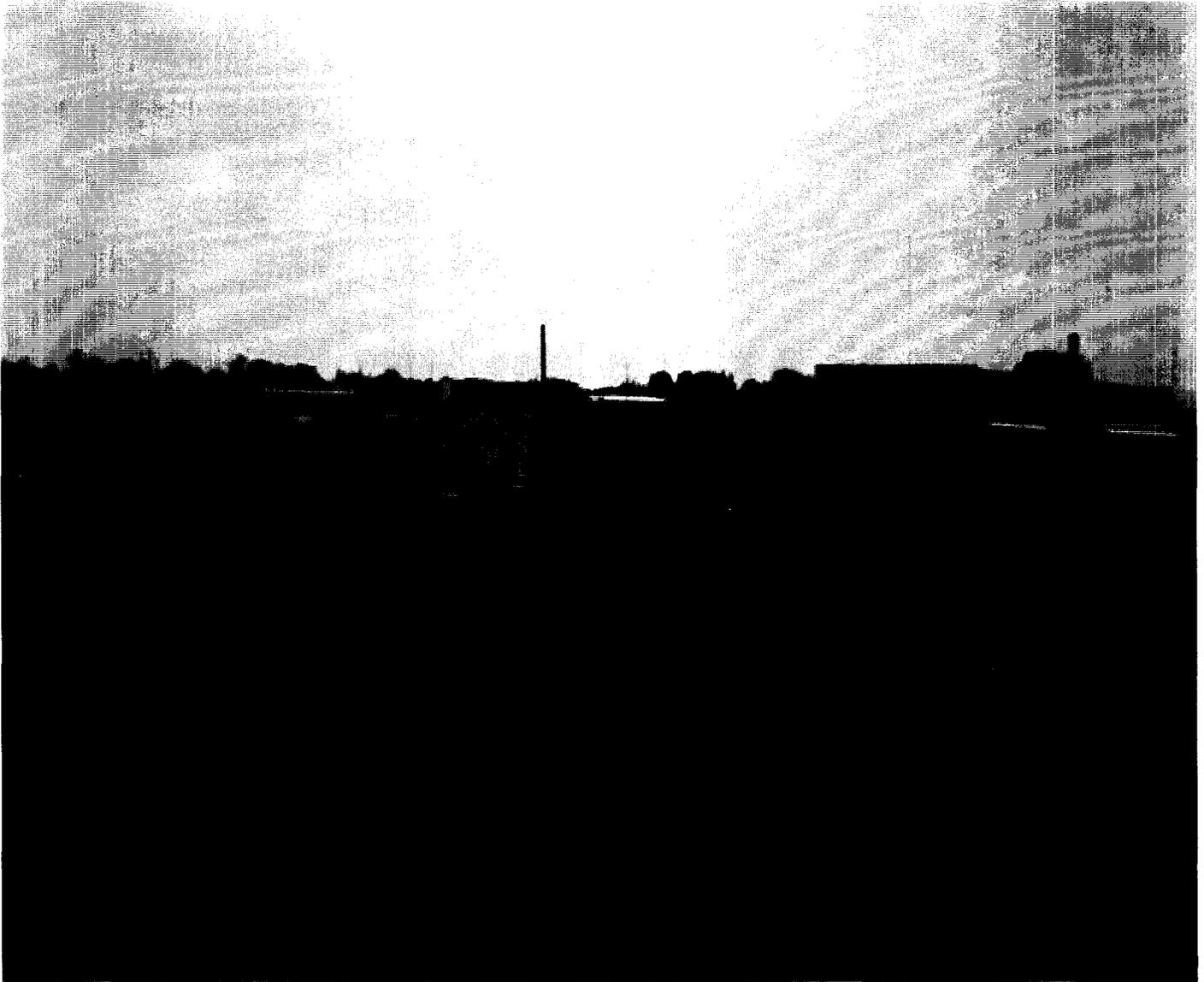
point	elevation	point	elevation
1	15.1886'	8	14.7313'
2	16.0946'	9	13.1897'
3	14.5718'	10	13.7623'
4	14.9606'	11	14.0250'
5	15.3118'	12	12.4375'
6	14.5036'	13	12.6086'
7	14.7200'	14	12.4393'

Note: Survey reference TBM is the railroad spike in the power pole located at the extreme southeast corner of the tank farm with an elevation of 16.31'.



7.0 PHOTOGRAPHS

7.1 SITE PRIOR TO UNEARTHING



The tank farm was leased to a farmer who had grazed approximately 30 cows and a couple of horses on the property for many years. There was running water and sewer services as well as electrical power on site. However, the utilities and equipment associated with the tanks and piping on site had not been maintained for several years and were overall in poor condition. Tank "P" site is shown to the right of the steam building and in front of the Norman C. Toole magnet school.

7.0 PHOTOGRAPHS

7.1 SITE PRIOR TO UNEARTHING



The tank farm was leased to a farmer who had grazed approximately 30 cows and a couple of horses on the property for many years. There was running water and sewer services as well as electrical power on site. However, the utilities and equipment associated with the tanks and piping on site had not been maintained for several years and were overall in poor condition. Tank "P" site is shown to the right of the steam building and in front of the Norman C. Toole magnet school.

7.2 PUMP ROOM STRIPPED OUT

Soil was excavated from the top of pump room. The pump room removable roof sections were removed. With the pump room opened, all pumps, motors, piping, and other components were rigged out and recycled as scrap metal. Then the pump room was cleaned by high pressure hot water (200degrees Fahrenheit) washing.



Components which were removed for disposal included electrical conduit and associated breaker panels, a dehumidifier system, piping and valves, the ventilation exhaust system, foundations for pumps and motors, personnel ladders and platforms. The pump room was high pressure cleaned and the wash water was pumped out and processed through the oily water separator. The pump room cleaning was completed and inspected by engineers from the DET and SOUTH DIV on 28 July 1998.

7.3 TANK TOP EXCAVATION



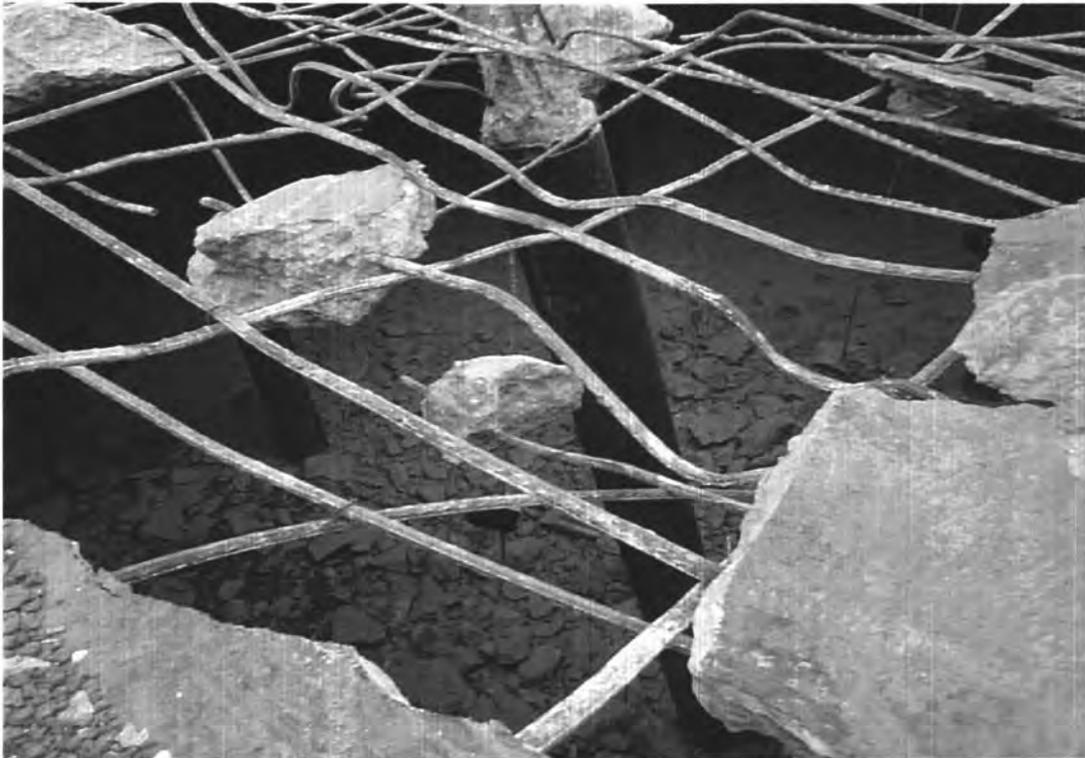
The top and approximately four feet down the sides of tank were excavated.

7.4 TANK DEMOLITION



The Volvo trackhoe was equipped with the hydraulic crusher/shear. The crusher broke up and reduced the concrete to small sizes. The crushed concrete was put into the remaining tank bottom section and was compacted with backfill to eliminate voids. The tank and pump room was constructed from concrete heavily reinforced with steel.

7.5 REBAR REMOVED



The steel rebar was cut up with the hydraulic shear.



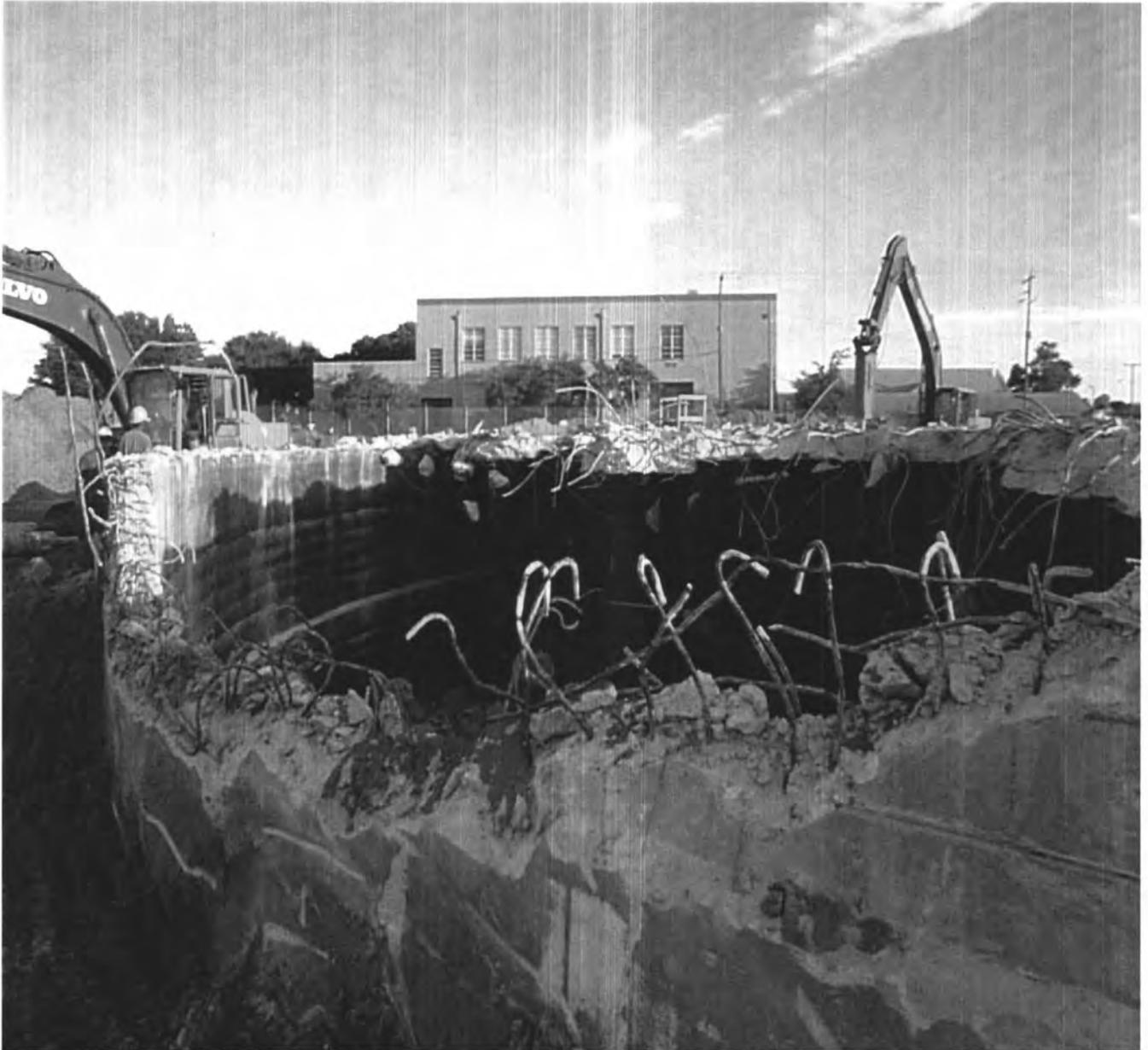
Rebar was segregated and recycled as scrap.

7.6 COLUMNS TAKEN DOWN



The concrete columns were completely taken down and crushed into small size concrete rubble. The rebar was recycled as scrap.

7.7 TANK TOP CRUSHED



The tank top and the wall were demolished with the hydraulic concrete crusher and the hydraulic jack hammer.

7.8 WALL CRUSHED

The excavation around the tank and pump room wall continued as the wall sections were demolished. The tank walls were taken down to approximately 7.5 feet above mean sea level. The excavation around the tank and pump room walls stopped just above the existing french drain system which was designed to drain ground water away from the tank.

7.9 PUMP ROOM WALL

Approximately 12 feet of the tank wall was demolished. The step in the wall shown in the picture occurred 10 feet down when the thickness changed from 16 inches to 22 inches of concrete. The wall was removed for the tank and pump room approximately two feet below that step. The wall height is approximately 7.5 feet above mean sea level.

7.10 PUMP ROOM CRUSHED

The pump room was constructed from 24 inch thick rebar reinforced concrete. The pump room walls were crushed down to approximately 7.5 feet above mean sea level. The crushed concrete was placed in the remaining wall and bottom of the pump room and was backfilled with soil to eliminate the voids.

7.11 PIPING ISOLATED



The 16 inch fill/suction piping and the 6 inch sludge piping was removed 45 feet away from the pump room.

7.12 BACKFILL COMPACTED



The remaining (3 – 4 feet deep) portion of the tank/pump room was backfilled with soil and vibratory compacted during application. This was backfilled to the top of the remaining wall sections.

7.13 CLAY CAP



Clay material was dumped on the contoured and sloped backfilled site. The clay was spread out with the trackhoe and wheel loader. The clay cap was applied a minimum of five feet past the top of the remaining walls. The clay cap was compacted and tested to ensure that water infiltration into the remaining tank bottom would be insignificant.



Clay cap material was applied in two separate lifts approximately eight inches thick.



Each lift was vibratory compacted with the smooth drum roller and the sheepfoot compactors. The hydraulic conductivity and Proctor density was tested for each lift (the results are provided in Appendix B).

7.14 FINISHED CONTOURED SITE

The site was backfilled, vibratory compacted, graded, and sloped. The finished grade has an elevation of 15-16 feet which slopes down from west to east to 12.5 feet above mean sea level. The remaining tank floor is 13-15 feet below the finished grade level. The ex-tank site has layers of different material. The layer on the tank bottom is approximately 4 feet of concrete rubble compacted with backfill. On top of the rubble is approximately 3-4 feet of backfill soil filled to the top of the remaining wall. Next is one foot of impervious clay material that is covered with approximately 5-6 feet of backfill soil.

7.15 HYDROSEEDING



The seedbed was prepared and the site was hydroseeded with winter rye and Bermuda grass seed to stabilize the soil and reduce erosion.

APPENDIX A

(SCDHEC approval letter)



30 July 1998

2000 Bull Street
Columbia, SC 29201-1708

COMMISSIONER:
Douglas E. Bryant

BOARD:
John H. Burriss
Chairman

William M. Hull, Jr., MD
Vice Chairman

Roger Leaks, Jr.
Secretary

Mark B. Kent

Cyndi C. Mosteller

Brian K. Smith

Rodney L. Grandy

Department of the Navy
Southern Division NFEC
P.O. Box 190010
North Charleston, SC 29419-9010
Attn: Mr. Gabriel Magwood

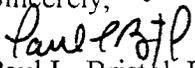
Re: Work Plan-Demolition Tank "P" dated 6 July 1998
Chicora Tank Farm (Site Identification # 13350)
Charleston Naval Complex/Charleston Naval Base
Charleston, SC
Charleston County

Dear Mr. Magwood:

The author has completed technical review of the referenced document. As discussed during our telephone conversation on 27 July 1998 the proposed demolition activities are approved for implementation. Please find enclosed the signed waiver form as requested.

Should you have any questions please contact me at (803) 734-5328.

Sincerely,


Paul L. Bristol, Hydrogeologist
Groundwater Quality Section
Bureau of Water

cc: Trident District EQC

DEMOLITION ON SITE WAIVER FORM
(Copy to RPM, Gabriel L. Magwood)

Regulation 61-107.11 Construction, Demolition, and Land-Clearing Debris Landfills states that wastes having been in contact with petroleum products and painted with lead-based paint to be disposed of in a lined monitored landfill such as a licensed municipal solid waste landfill or a industrial solid waste landfill. Some of the concrete has not been in direct contact with the petroleum products. The exemption to this, (SC R.61-107.11(A)(5)) states clean hardened concrete not in direct contact with petroleum products and not painted with lead-based paint when used as structural fill in the construction of a foundation for a building project in progress is "clean" and eligible for burial on site under this exemption.

SCDHEC and SOUTHDIV have negotiated a specific disposal plan for the concrete waste which is affordable and protective of the environment (See Appendix G Meeting Minutes dated 12 August 1996 from Enterprise Engineering, Inc., Project Number 95-1878).

Regulators agree that the concrete construction debris (which has been cleaned free of any petroleum products by pressure washing) from tank "P" and pump room demolition will be disposed of within the tank and pump room bottom only. Since the concrete waste will be contained in the lower section of the tank "P" and pump room, this waiver authorizes the one time exemption to the solid waste regulation for the disposal of concrete debris at Chicora Tank Farm. However, during the partial demolition sound engineering and good work practices will be used ensuring the protection of the environment.

SCDHEC

Al V. Brant
(Concur)

Date 7/27/98

APPENDIX B

(Results from Proctor density testing and permeability tests)

- Pages 1 & 2 Moisture ,density and permeability results from the clay as sampled in the Clay pit.. Samples were taken 9/02/98 and analyzed 9/08/98.
- Pages 3 – 5 The in-place samples taken from the first clay lift were analyzed on 10/14/98 were analyzed for density, moisture, compaction, permeability. Samples were taken on 9/17/98.
- Pages 6 – 8 The in-place samples from the second lift were taken on 9/28/98 and analyzed on 10/13/98. These samples were analyzed for the same things as immediately above.

Materials
Testing Report

SOIL CONSULTANTS, INC.
Engineers and Geologists

Modified Proctor Test
ASTM D 1557 - Method B

Client: Officer Incharge Construction

Project And State: Chicora Tank Farm,
North Charleston, S.C

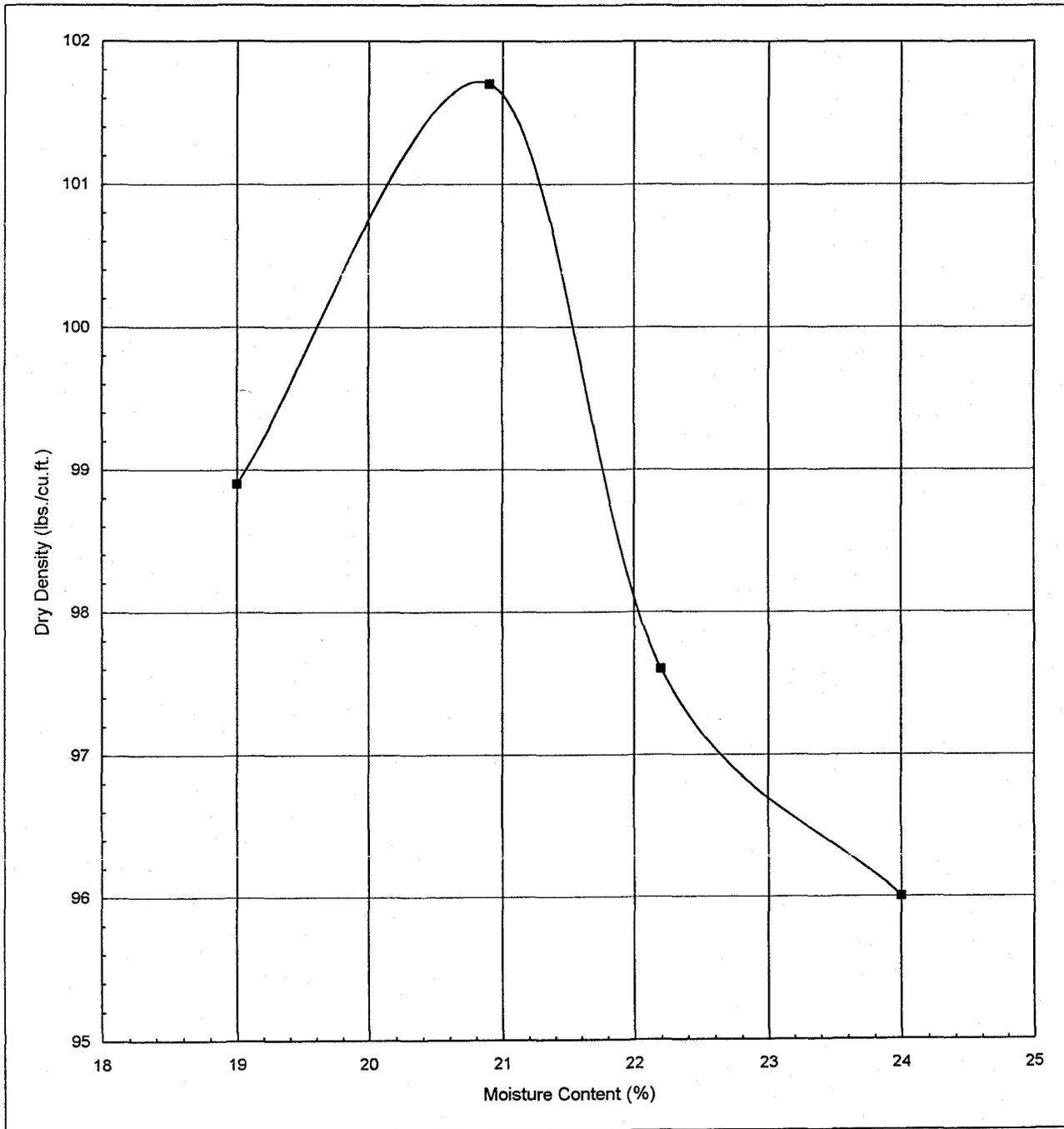
SCI Project:
98-1689

Calculations By: ADC
Approved By: LDD

Date:
September 8, 1998

Sample Type:
Bucket Sample

Sample No.



Optimum Moisture Content: 20.9%

Maximum Dry Density: 101.7 lb/cu ft

REMARKS: Visually identified as a Grayish Tan Inorganic Clay

Respectively Submitted:

SOIL CONSULTANTS, INC.

Materials Testing Report	SOIL CONSULTANTS, INC.		HYDRAULIC CONDUCTIVITY TEST ASTM - D 5084
	Project And Location:	Chicora Tank Farm North Charleston, S.C	
SCI Project:	98-1689	Date:	9-10-98

SAMPLE IDENTIFICATION	S #1			
	REMOLED (clay w/vry. sli. sand)			
INITIAL CONDITIONS				
Sample Length, cm	5.08			
Sample Diameter, cm	5.08			
Moisture Content, %	20.9			
Unit Wet Weight, pcf	120.2			
Unit Dry Weight, pcf	99.4			
Specific Gravity	2.65			
Porosity %	39.7			
Saturation, %	83.9			
FINAL CONDITIONS				
Sample Length, cm	5.3594			
Sample Diameter, cm	5.2832			
Moisture Content, %	30.7			
Unit Wet Weight, pcf	117.1			
Unit Dry Weight, pcf	89.5			
Saturation, %	96.5			
TEST CONDITIONS				
Permeant	Potable Water			
Cell Pressure, psi	20			
Back Pressure, psi	19-17			
B-value	.96			
Average Gradient	27.6			
Hydraulic Conductivity, cm/sec @ 20 deg. C	5.83E-8			

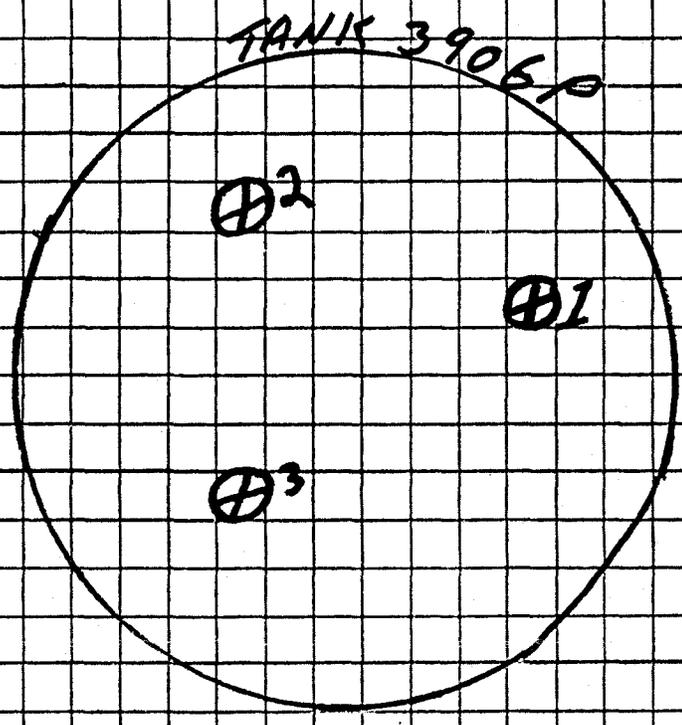
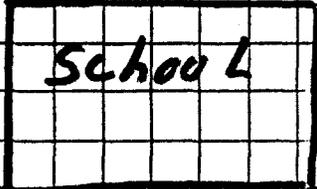
SOIL CONSULTANTS, INC.

SOIL CONSULTANTS, INC.

DATE 9-17-98 PROJECT OR JOB NO. 98-1827
INITIALS AC

TITLE Chicora Tank FARM

FORM BC
NOT TO SCALE



Truck
CARNER AVENUE



Materials Testing Report	SOIL CONSULTANTS, INC.	HYDRAULIC CONDUCTIVITY TEST ASTM - D 5084
Project And Location:	Chicora Tank Farm North Charleston, S.C.	
SCI Project: 98-1827		Date: 10-13-98

SAMPLE IDENTIFICATION

Tank #3906P Density Test #1, 1st Lift (clay w/sl. sand)	Tank #3906P Density Test #3, 1st Lift (clay w/sl. sand)	
---	---	--

INITIAL CONDITIONS

Sample Length, cm	5.08	5.08	
Sample Diameter, cm	5.08	5.08	
Moisture Content, %	19.9%	21.0%	
Unit Wet Weight, pcf	120.7	135.6	
Unit Dry Weight, pcf	100.7	112.0	
Specific Gravity	2.70	2.70	
Porosity %	40.2%	33.5%	
Saturation, %	79.8	112.7	

FINAL CONDITIONS

Sample Length, cm	5.08	5.08	
Sample Diameter, cm	5.08	5.08	
Moisture Content, %	20.4%	22.4%	
Unit Wet Weight, pcf	122.3	134.8	
Unit Dry Weight, pcf	101.6	110.2	
Saturation, %	83.5	114.2	

TEST CONDITIONS

Permeant	Potable Water	Potable Water	
Cell Pressure, psi	30	30	
Back Pressure, psi	28-27	28-27	
B-value	0.100	0.96	
Average Gradient	28.3	28.3	
Hydraulic Conductivity, cm/sec @ 20 deg. C	4.00×10^{-8}	4.03×10^{-8}	

Undisturbed Specimens

Soil Consultants, Inc.


SOIL CONSULTANTS, INC.

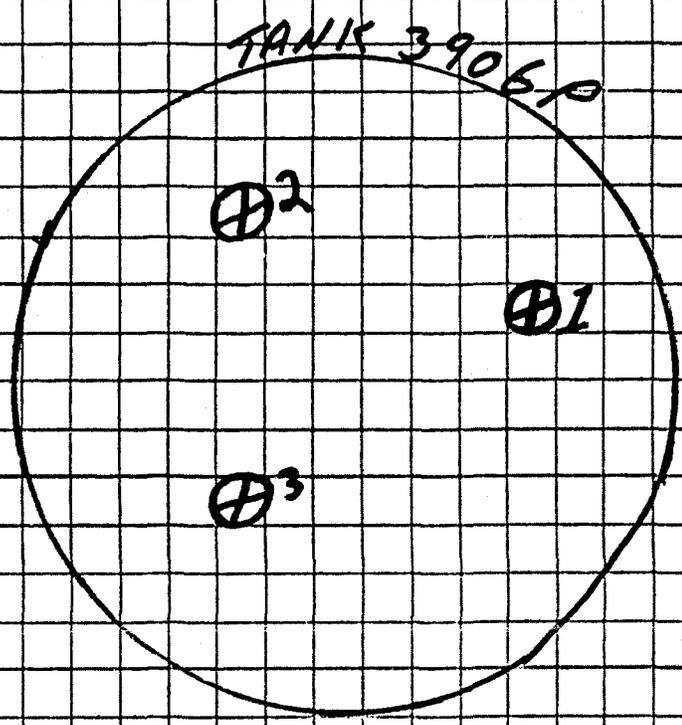
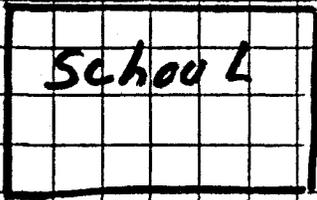
DATE 9-28-98

PROJECT OR JOB NO. 98-1828

TITLE Chicora Tank FARM

INITIALS AC

NOT TO SCALE



UNIVERSITY TRACT

CARNER AVENUE



Materials Testing Report	SOIL CONSULTANTS, INC.	HYDRAULIC CONDUCTIVITY TEST ASTM - D 5084
Project And Location:	Chicora Tank Farm North Charleston, S.C.	
SCI Project: 98-1828		Date: 10-13-98

SAMPLE IDENTIFICATION

Tank #3906P Density Test #1, 2nd Lift (clay w/sl. sand)	Tank #3906P Density Test #2, 2nd Lift (clay w/sl. sand)	Tank #3906P Density Test #3, 2nd Lift (clay w/sl. sand)
---	---	---

INITIAL CONDITIONS

Sample Length, cm	5.08	5.0165	5.08
Sample Diameter, cm	5.08	5.08	5.08
Moisture Content, %	24.8%	29.6%	24.4%
Unit Wet Weight, pcf	120.7	118.6	112.3
Unit Dry Weight, pcf	96.7	91.5	90.3
Specific Gravity	2.70	2.70	2.70
Porosity %	42.6%	45.7%	46.4%
Saturation, %	90.4	95.1	75.9

FINAL CONDITIONS

Sample Length, cm	5.08	5.0165	5.08
Sample Diameter, cm	5.08	5.08	5.08
Moisture Content, %	27.5%	33.7%	33.1%
Unit Wet Weight, pcf	122.3	120.0	113.7
Unit Dry Weight, pcf	95.9	89.8	85.4
Saturation, %	98.1	103.6	92.0

TEST CONDITIONS

Permeant	Potable Water	Potable Water	Potable Water
Cell Pressure, psi	30	30	30
Back Pressure, psi	28-27	28-27	28-27
B-value	0.96	0.105	0.95
Average Gradient	28.3	28.3	28.3
Hydraulic Conductivity, cm/sec @ 20 deg. C	3.593 x 10 ⁻⁸	4.057 x 10 ⁻⁸	4.56 x 10 ⁻⁸

Undisturbed Specimens

Soil Consultants, Inc.