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NAS CECIL FIELD, FL
5090.3a

DESIGN BASIS DOCUMENT FOR OPERABLE UNIT 7 (OU 7) SITE 16 SEWER SYSTEM

DRAFT ACTING AS FINAL NAS CECIL FIELD FL

8/10/1998

TETRA TECH NUS INC

Draft
Design Basis Document
for
Operable Unit 7, Site 16
at

Naval Air Station Cecil Field
Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888

Contract Task Order 0051

August 1998

089808/P

DRAFT
DESIGN BASIS DOCUMENT
FOR
OPERABLE UNIT 7, SITE 16

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
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CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0051

AUGUST 1998

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ACRONYMS

ASTM	American Society for Testing and Materials
B&R Environmental	Brown & Root Environmental
CLEAN	Comprehensive Long-Term Environmental Action Navy
CTO	Contract Task Order
CURT	Clean-up Review Team
DCE	Dichloroethene
gpm	Gallons per Minute
IDW	Investigative-derived Waste
NAS	Naval Air Station
POA	Plan of Action
PPE	Personal Protection Equipment
TAT	Turn-around Time
TCE	Trichloroethene
TtNUS	Tetra Tech NUS, Inc.
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 RECENT SITE HISTORY

The Southern Division of the Naval Facilities Engineering Command issued Contract Task Order (CTO) 51 to Tetra Tech NUS, Inc (TtNUS), (formerly Brown & Root Environmental [B&R Environmental]) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) III Contract No. N62467-94-D-0888. Under CTO 51, TtNUS performed a pilot-scale treatability study in 1998 within the storm drain system at Operable Unit 7, Site 16, Naval Air Station (NAS), Cecil Field, Jacksonville, Florida. The study evaluated selected remedial options to remove volatile organic compounds (VOCs) from groundwater which infiltrated into the storm sewer system.

The evaluation was performed according to the work plan prepared by B&R Environmental (B&R Environmental, April, 1998). The technologies evaluated consisted of (1) installing weirs to cause volatilization of VOCs, (2) providing a cross ventilation system to volatilize the compounds, and (3) a combination of (1) and (2). The remedial objective is to reduce the concentration of trichloroethene (TCE) at the storm sewer outfall to meet the Florida State MCL of 3 µg/l.

The results of the study were presented in the Draft Pilot-Scale Treatability Study Report for Operable Unit 7, Site 16 (B&R Environmental, June 1998). The results of the evaluations determined that the technologies were not effective in meeting the objective of reducing TCE concentrations at the outfall. Other alternatives which did not require field testing were also evaluated in the report. Based on the unfavorable results of the study, an alternative action was presented and recommended. The recommended action was to reline a segment of the sewer to reduce infiltration, thus reducing the concentration of TCE at the outfall.

Figure 1-1 provides a layout of the storm sewer system with regards to the identified TCE plume. Appendix A provides a summary of the analyses from water samples form the storm sewer.

1.2 REPORT ORGANIZATION

This pilot-study report consists of the following sections.

- Section 1.0 presents the site history and report organization.
- Section 2.0 presents the requirements of the design of the sewer relining.

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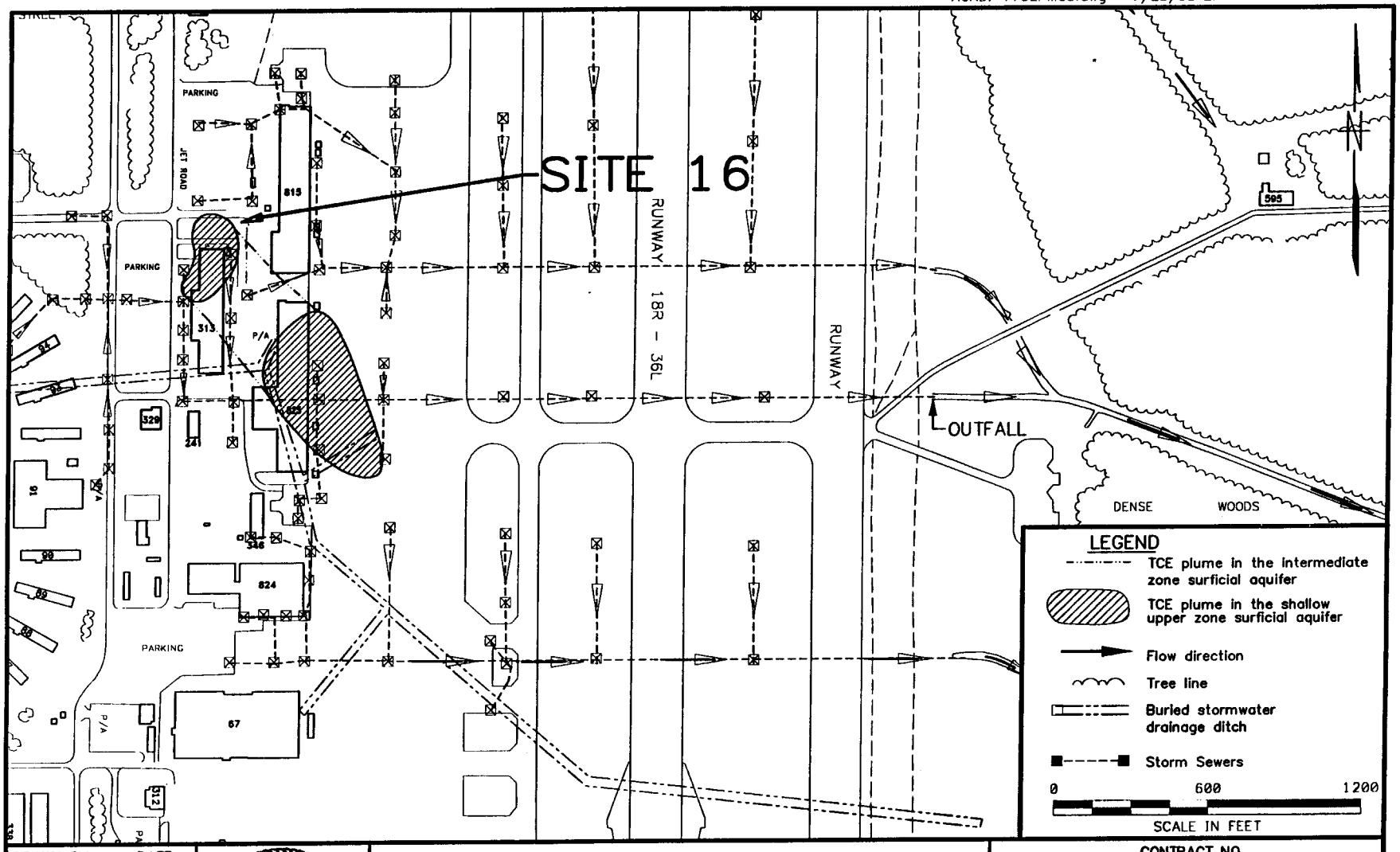

DRAWN BY TAD DATE 2/20/98	SITE MAP SITE 16 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 7792
CHECKED BY SWH DATE 2/20/98		APPROVED BY DATE
COST/SCHED-AREA		APPROVED BY DATE
SCALE AS NOTED		DRAWING NO. FIGURE 1-1 REV. 0

FORM CADD NO. SDV_AH12.DWG - REV 0 - 1/20/98

2.0 DESIGN BASIS

2.1 INTRODUCTION

The work described herein is for the repair and relining of a segment of a storm sewer located at NAS Cecil Field. The segment of the sewer to be relined is in the vicinity of Building 313 - Site 16 as shown on Figure 2-1. The work is being performed to eliminate impacted groundwater from infiltrating into the storm sewer system and ultimately discharging to Sal Taylor Creek above Florida Department of Environmental Protection (FDEP) limitations for TCE. The Contractor shall provide all necessary labor, equipment, and materials to complete the work.

From 1959 to 1980 liquid wastes (containing solvents such as TCE) were generated from machine and engine parts cleaning in Building 313. These liquid wastes were discharged without treatment into a seepage pit that was located north of Building 313. The wastes subsequently infiltrated the vadose zone soil and the underlying aquifer. In 1994, the seepage pit was included in a removal action. At that time, vadose zone soil containing TCE at concentrations greater than 1 mg/kg was removed and disposed of off site. Other investigations identified and quantified the presence of a VOC plume consisting of chlorinated solvent compounds (mainly TCE) in the surficial aquifer. TCE contamination was also detected in the water flowing through the storm sewers that are adjacent to and downgradient of the source area.

Figure 1-1 is a site map that identifies the location of the storm sewer system and identified TCE plume.

2.2 DESCRIPTION OF WORK

The storm sewer consists of various diameters of pipe and is of corrugated steel construction. The interior is apparently heavily coated with a tar mastic material. Only the length of the storm sewer between the identified manholes (see below) is to be relined using a cured-in-place lining as identified in the Navy SPECINTACT specification section 02776, provided in Appendix B. Work at the termination points of the sewer is limited to that which is needed to grout or otherwise attach the relining material smoothly to the existing structures. The following storm sewer segment is to be relined, based on the Treatability Study Report (B&R Environmental, June 1998):

1. West of Building 313, 66" diameter about 75 feet long between manholes STM2-6 and STM 2-7.

A cost estimate for the work is included in Appendix C.

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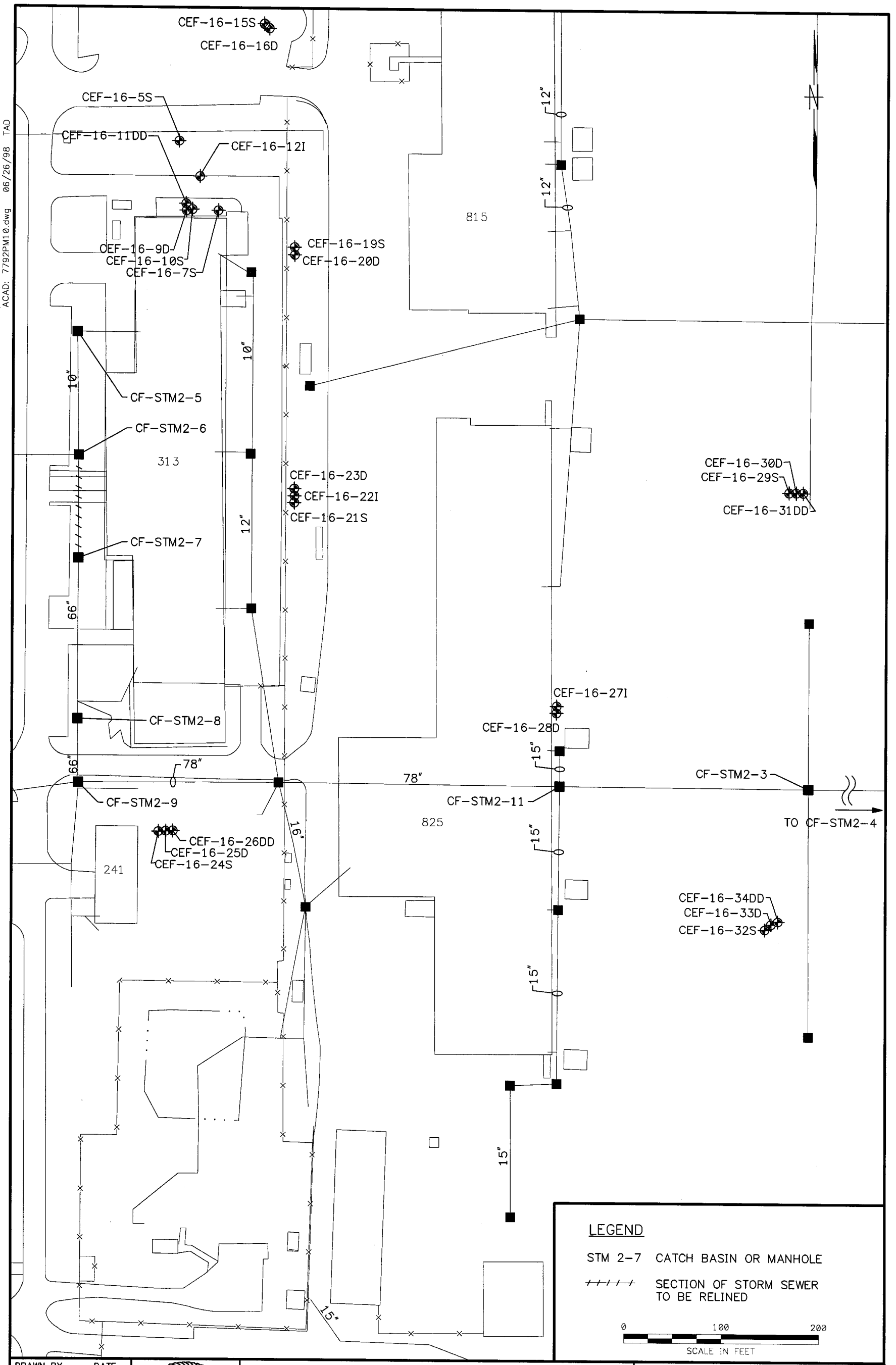

DRAWN BY DLT 1/28/98	STORM SEWER SYSTEM LAYOUT OU7 SITE 16 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 7792	
CHECKED BY SWH 2/20/98		APPROVED BY DATE	
COST/SCHED-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 2-1	REV. 0

CADD NO. SDV_BV12.DWG - 7/23/98 EP

2.3 EXISTING CONDITIONS

The storm sewer system carries storm water from the central portion of the facility to the main storm sewer lines which discharge to a drainage ditch that flows into Sal Taylor Creek. The sewer has deteriorated to such an extent that contaminated groundwater is infiltrating the storm sewer at several locations. A limited inspection of the sewer found a 3' long hole on the pipeline floor about 30' from manhole STM2-6. No other significant damage was identified.

Samples of water flowing in the storm sewers collected during dry weather conditions were analyzed (See Appendix A). Concentrations of TCE up to 190 ug/l and 1,2-Dichloroethene up to 74 ug/l were detected in samples collected from manholes near Building 313. A summary of the analytical results and the existing conditions are described in the *Draft Pilot-Scale Treatability Study Report for Operable Unit 7, Site 16 at Naval Air Station Cecil Field* (B & R Environmental, June 1998).

Figure 2-1 depicts the sewer route and segment to be relined.

2.4 PERFORMANCE REQUIREMENTS

The work will be done in accordance with Navy SPECINTACT Specification 02776. A general description of the process can be found in "Sewer System Infrastructure Analysis and Rehabilitation Handbook", EPA/625/6-91/030, USEPA, Office of Research and Development, Cincinnati, OH. The lining system described in Section 2.2 is by Insituform. An alternative vendor may be offered for review and approval. Submittals shall be provided as required by specifications.

The portion of the sewer to be repaired shall be inspected and videotaped prior to relining. Existing field conditions and measurements, including sewer diameters and materials, shall be confirmed. All major holes in the existing pipeline that will interfere with the relining installation prior to relining shall be repaired.

All existing surfaces that are to be repaired or relined shall be cleaned and prepared to ensure that the existing piping does not interfere with the new lining. All material removed from the sewer and all cleaning fluids shall be disposed of by the Contractor.

Normal flow and storm water flow shall be diverted around the section of sewer being repaired and water shall be prevented from contacting the new lining until the lining has sufficiently cured and has been inspected.

A cured-in-place lining to the storm sewer shall be applied using an inversion tube that can provide for adjustable head. The lining system shall conform with ASTM F 1216, latest edition. The lining shall be a resin-impregnated flexible tube inserted into the sewer by hydrostatic head. The resin shall be cured using circulating hot water according to the manufacturer's recommendations. Water temperature shall be monitored to maintain the proper curing temperature. The liner shall be allowed to cool before releasing the hydrostatic head. The relined section shall be continuous with no joints other than the terminations and attachments at the manholes. The liner shall be sealed at the manhole terminations.

The liner tubing design shall assume that the existing sewer is structurally deteriorated; that the groundwater level can be up to the ground surface; tubing under pavement shall meet H-20 live loads; and that the flow capacity of the liner shall meet or exceed that of the existing pipeline.

After the lining has cured, the lining shall be inspected for defects, such as intrusions, dry spots, pin holes and delamination. Any defects shall be repaired at the Contractor's expense. Lateral connections, if present, shall be cut in and restored by the Contractor. A videotape of the final inspection shall be provided.

REFERENCES

Brown & Root Environmental, June 1998. Draft Pilot-Scale Treatability Study Report for Operable Unit 7, Site 16 at Naval Air Station Cecil Field.

Sewer System Infrastructure Analysis and Rehabilitation Handbook, EPA/625/6-91/030, USEPA, Office of Research and Development, Cincinnati, OH, 1991.

APPENDIX A

ANALYTICAL RESULTS

TABLE 2-2

PRELIMINARY INVESTIGATION ANALYTICAL RESULTS
OPERABLE UNIT 7, SITE 16
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Location	Date	Sample ID	Concentration of TCE (μg/L)
STM 2-7N	4/23/98	CF16-STM-07N-POR1	180
STM 2-8N	4/23/98	CF16-STM-08N-POR1	140
STM 2-9N	4/23/98	CF16-STM-09N-POR1	130
STM 2-10W	4/23/98	CF16-STM-10W-POR1	54
STM 2-11W	4/23/98	CF16-STM-11W-POR1	68
STM 2-11S	4/23/98	CF16-STM-11S-POR1	6
STM 2-3W	4/23/98	CF16-STM-03W-POR1	60
STM 2-4W	4/23/98	CF16-STM-04W-POR1	20

Note: One air sample was collected during the preliminary investigation at storm sewer STM 2-7 (sample ID: CF16-AS-07N-PORI) and analytical results identified a concentration of 2.14 ppb of TCE.

TABLE 3-2

VOC DETECTED CONCENTRATIONS IN STORM SEWER WATERS
OU7 SITE 16
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Sampling Event					
	TCE			DCE		
	Oct 94	Dec 94	97	Oct 94	Dec 94	97
STM 1-1	ND	NA	NA	ND	NA	NA
STM 1-2	6	NA	NA	ND	NA	NA
STM 1-3	ND	NA	NA	ND	NA	NA
STM 2-1	ND	NA	NA	NA	NA	NA
STM 2-2	126	79	NA	52	31	NA
STM 2-3	55	NA	25	19	NA	17
STM 2-4	26	NA	10	10	NA	5
STM 2-5	NA	ND	NA	NA	ND	NA
STM 2-6	ND	ND	NA	ND	ND	NA
STM 2-7	NA	190	140	NA	74	120
STM 2-8	NA	170	NA	NA	70	NA
STM 2-9	NA	33	NA	NA	13	NA
STM 2-10 (See STM 2-2 above)	---	---	---	---	---	---

Source: RI, ABB, July 1995 and ABB e-mail
Note: STM 2-2 was renamed STM 2-10 during the December 1994 sampling round.

APPENDIX B

SPECIFICATION

SECTION 02776

STORM SEWER SYSTEM

PART 1 GENERAL

1.1 SUMMARY

This specification provides requirements to install Storm Sewer Pipe Lining in existing Storm Sewer Pipes.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F 1216	(1991) Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin Impregnated Tube.

1.3 SYSTEM DESCRIPTION

1.3.1 Cured-In Place Lining

Provide reconstruction of existing sewer pipelines by the installation of a resin-impregnated flexible tube inverted into the original conduit by use of a hydrostatic head. Cure resin by circulating hot water within the tube. When cured, the finished pipe shall be continuous and formed to the original conduit. The system shall be capable of being used in pipelines where reductions in cross sectional areas of pipelines are less 40 percent of the existing pipeline.

1.4 SUBMITTALS

Submit the following in accordance with the Basic Contract.

1.4.1 SD-02, Manufacturer's Catalog Data

a. Cured-in-place lining

1.4.2 SD-06, Instructions

a. Cured-in-place liner

1.4.3 SD-13, Certificates

a. Cured-in-place liner

1.5 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Protect from sunlight and other ultraviolet light sources during storage. Do not store materials on the ground. Keep cements and

adhesives from extreme cold or heat. Keep materials clean and dry. Handle materials in such a manner as to ensure installation in an undamaged condition.

1.6 CRITERIA FOR BIDDING

Base bids on the following:

a. Light cleaning will be sufficient for all of the manhole reaches.

b. No point repairs or obstructions in lines will be encountered other than those indicted.

c. Manholes are accessible to cleaning and video equipment.

d. Water for cleaning of sewer lines will be provided from the existing water distribution system. Provide and use state approved backflow prevention (RPZ) assembly when accessing water distribution system. Provide miscellaneous materials required to supply the water to the sewer systems.

1.7 MAINTENANCE OF FLOWS

Flows shall be bypassed and maintained as specified below:

a. Plug all lines leading to and from the manholes and pipes that work will be accomplished.

b. Provide, install and maintain a pump of sufficient size and capacity to divert all waters from the work areas.

c. Provide all the necessary pipe, plugs, labor and material to accomplish the bypass operation.

d. Provide barricades to block traffic, prevent access by unauthorized personnel from entering job site and to identify hazardous areas. Coordinate street barricades with the Contracting Officer and the Station Security personnel.

PART 2 PRODUCTS

2.1 CURED-INPLACE-LINING

2.1.1 Flexible Tubing

Materials shall meet the requirements of ASTM F 1216, Section 5.1. The tubing shall be fabricated to a size that when installed, will form to the internal circumference and length of the original pipe. Allowance shall be made for circumferential stretching during inversion. The outside layer of tubing, (before inversion), shall be plastic coated with a transparent flexible material that is compatible with the resin system used. The plastic coating shall not be subject to delamination after cure of the tubing. The tubing shall not contain intermediate or encapsulated elastomeric layers. Materials subject to delamination in the cured tube, shall not be included in the tube.

2.1.2 Resin

Resin shall meet the requirements of ASTM F 1216, Section 5.2.

2.1.3 Color

The wall color of the interior pipe surface of the tubing, after installation, shall not be of a dark or non-reflective nature that could inhibit proper closed circuit television inspection.

2.1.4 Design Requirements

The tubing shall be designed as per ASTM F 1216, Appendix XI, with the following additional requirements:

a. Existing pipelines shall be assumed to be structurally deteriorated, in that the existing pipe shall not be expected to provide structure strength.

b. The tubing design shall assume no boding to the original pipe wall.

c. External Hydrostatic Design: Ground water level shall be assumed to be at ground level.

d. Live Loads: Tubing under pavement shall be designed to meet the live loads generated by the American Association of State Highway and Transportation Officials H-20 Loading.

e. The bond between tubing layers shall be strong and uniform. All layers, after cure, must form one homogeneous structural pipe wall with no part of the tube left unsaturated by resin.

f. The flow capacity of the liner shall meet or exceed those of existing gravity pipelines.

g. Material removed from sewer lines shall be tested by TCLP (full regulatory list) test to determine if material is hazardous. Disposal of material shall be off Government property with the written approval of the Contracting Officer.

PART 3 EXECUTION

3.1 CLEANING AND INSPECTION OF SEWERS

Prior to any lining work, clean and inspect the pipelines to locate existing services and prepare the existing pipelines for the insertion of the liner.

3.1.1 Cleaning of Sewers

Provide equipment necessary for the proper high pressure water jetting, rodding, bucketing, brushing and flushing of the sewers prior to the inspection by closed circuit television. Provide light and heavy cleaning as required. Equipment such as bails, scooters, high pressure water jetting equipment, brushes, and swabs will be permitted for light cleaning. Where it is determined that large deposits of debris or root growth exists within sewer lines, heavy equipment shall be used to facilitate the removal of such deposits. Bucket machines, scrapers, and augers may be utilized to perform heavy duty cleaning. Where bucket machines and buckets are used, caution shall be taken to ensure a proper sized flexible cable is used to prevent breakage, resulting in the hanging up of cleaning equipment within the sewer line. Dirt, debris, roots and other materials removed from the sewage system shall be disposed of off Government property with the approval of the Contracting Officer.

3.1.2 Television Inspection of Sewers

Provide closed circuit television inspection of the sewers. Operation of the equipment shall be controlled from above ground with a skilled technician controlling the movement of the television camera. The technician shall have the capability to adjust the brilliance of a built-in lighting system and be able to change the focus of the television camera by remote control. The view of the television camera shall be transmitted to a monitor not less than 17 inches. The television camera shall have the capability of transmitting a picture with not less than 600 lines of resolution, and the monitor shall be capable of receiving the same. The monitor shall be located inside a mobile TV studio. The Contractor's mobile studio shall be large enough to accommodate up to six people for the purpose of viewing the monitor while the inspection is in progress. The Contracting Officer shall have access to view the television screen at all times. The cable or rod shall have a footage meter so that the location of the TV camera and the point of observation will be known at all times. The electricity for operations shall be furnished by the Contractor.

3.1.3 Video Tapes

After the completion of the contract, furnish to the Contracting Officer a video tape copy of all inspections made before and after repairs are accomplished.

3.2 CURED-IN-PLACE LINER

3.2.1 Installation of Liner

Designate a location where the uncured resin in the original container and the unimpregnated liner can be "Wet-Out" prior to installation. A resin and catalyst system compatible with the requirements of this method shall be used. The quantities of the liquid thermosetting material shall be sufficient to provide the lining thickness specified herein. The wet-out liner material shall be inserted through an existing manhole by means of an inversion tube capable of applying the hydrostatic head required to fully extend the liner to the next designated manhole. The impregnated liner material shall be inserted into the inversion tubes with the impermeable plastic membrane side out. At the lower end of the inversion tube, the lining shall be turned inside out and attached to the inversion tube so that a leakproof seal is created. The inversion head shall be adjusted to be of sufficient height to invert the liner from manhole to manhole and designed to hold the liner sung to the pipe wall and to produce dimples at side connections and flared ends at the manhole. Care shall be taken not to over stress the felt fiber at the elevated curing temperatures that may cause damage to the liner prior to cure.

3.2.2 Liner Curing

Supply a suitable heat source and water recirculating equipment capable of delivering hot water to the far end of the liner, to raise the water temperature uniformly in the entire liner, above the temperature required to commence the exothermic reaction of the resin as determined by the resin/catalyst system employed. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply and the temperature under the liner at the remote manhole to determine when uniform temperature is achieved throughout the length of the liner. Water temperature in the liner during the cure period shall not be less than 160 degrees F or more than 200 degrees F. Live steam shall not

be permitted to enter the curing liner. Initial cure shall be deemed to the completed when a uniform temperature, as determined by the water temperature monitors on the head source, is achieved throughout the length of the liner and the exposed portions of the liner appear, by visual inspection, to be hard and sound. The cure period shall be of a duration recommended by the manufacturer of the resin, during which time the recirculation of the water to maintain the temperature in the liner within the temperature range shall be continued. Hot water may be bled out of the system and replaced with cooler water from the water source to control post cure water temperature.

3.2.3 Cool Down

Cool the hardened liner to a temperature below 120 degrees F before relieving the static head in the inversion tube. Care shall be taken in the release of the static head such that a vacuum, that may damage the newly installed liner, is not developed.

3.2.4 Finish

The finished lining shall be continuous over the entire length of an insertion run between two manholes and be free from visual defects such as foreign intrusions, dry spots, pinholes and delamination. The lining shall be impervious and free from any leakage from the pipe to the surrounding ground to the inside of the lined pipe. Any defects which may affect the integrity or strength of the lining, shall be repaired at the Contractor's expense, in an approved manner.

3.2.5 Sealing Liner in Manholes

If, due to broken or misaligned pipe at the manhole wall, the lining fails to make a tight seal, apply a seal at that point. The seal shall be of resin mixture compatible with the liner.

3.2.6 Service Connection

After the liner has been cured, reconnect the existing live service connections. Reconnection shall be accomplished, generally without excavation, from the interior of the pipeline by means of a television camera and a cutting device that re-established the service to not less than 90 percent capacity.

3.3 FIELD QUALITY CONTROL

3.3.1 Inspection

Inspect completed liner for pinholes, punctures, and tears. Inspect seams and joints for unbonded areas. Repair defects as specified herein.

3.3.2 Testing

Test each completed manhole reach to ensure proper seal between the liner and the original pipe to prevent any leakage.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
STORM SEWER RELINING, OU 7, SITE 16, NAS CECIL FIELD

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02776	SD-02 Manufacturer's Catalog Data															
			Cured-in-place lining	1.3.1														
			SD-06 Instructions															
			Cured-in-place liner	3.2														
			SD-13 Certificates															
			Cured-in-place liner	3.2														

APPENDIX C

COST ESTIMATE

NAVAL AIR STATION - Cecil Field
Jacksonville, Florida
OU7 - Site 16
Alternative #1 - Pipe Relinement

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Total Cost Subcontract	Total Cost Material	Total Cost Labor	Total Cost Equipment	Total Direct Cost
1 MOBILIZATION/DEMOBILIZATION											
1.1 Office Trailer (2 for 1 months)	2	mo	$215.00				$430	$0	$0	$0	$430
1.2 Equipment Mobilization/Demobilization	1	ls	$8,000.00				$8,000	$0	$0	$0	$8,000
1.3 Site Utilities	1	mo	$4,000.00				$4,000	$0	$0	$0	$4,000
1.4 Decontamination Trailer	1	mo	$2,332.00				$2,332	$0	$0	$0	$2,332
2 DECONTAMINATION											
2.1 Equipment Decon Pad	1	ls		$3,000.00	$3,500.00	$400.00	$0	$3,000	$3,500	$400	$6,900
2.2 Decontamination Services (man-weeks)	2	wk		$840.00			$0	$1,680	$0	$0	$1,680
2.3 Decon Water	1000	gal	$0.20				$200	$0	$0	$0	$200
2.4 Decon Water Storage Tank, 6,000 gallon	1	mo	$641.30				$641	$0	$0	$0	$641
2.5 PPE (6 p * 5 days * 2 weeks)	60	day		$30.00			$0	$1,800	$0	$0	$1,800
2.6 Disposal of Decon Water	1	mo	$3,000.00				$3,000	$0	$0	$0	$3,000
2.7 Disposal of PPE	1	mo	$1,500.00				$1,500	$0	$0	$0	$1,500
3 PIPE REPLACEMENT											
3.1 Temporary Pipe By-pass, 4" diaphragm (level D)	10	day			$89.68	$23.00	$0	$0	$897	$230	$1,127
3.2 Pipe Cleaning and Lining	73	lf	$440.00				$32,120	$0	$0	$0	$32,120
3.3 Misc. Pipeline Work	1	ls	$2,000.00				$2,000	$0	$0	$0	$2,000
3.4 Transport of Pipe Cleaning Waste (20 drums)	1	ls	$2,330.00	$1,366.00	$241.00		$2,330	$1,366	$241	$0	$3,937
3.5 Disposal of Waste	20	ea	$140.00				$2,800	$0	$0	$0	$2,800
Subtotal							$59,353	$7,846	$4,638	$630	$72,467
Overhead on Labor Cost @ 30%									$1,391		$1,391
G & A on Labor Cost @ 10%									$464		$464
G & A on Material Cost @ 10%								$785			$785
G & A on Subcontract Cost @ 10%							$5,935				$5,935
Total Direct Cost							$65,289	$8,631	$6,493	$630	$81,042
Indirects on Total Direct Labor Cost @ 75%									$4,870		$4,870
Profit on Total Direct Cost @ 10%											$8,104
Subtotal											$94,016
Health & Safety Monitoring @ 5%											$4,701
Total Field Cost											$98,717
Contingency on Total Field Cost @ 30%											$29,615
Engineering on Total Field Cost @ 5%											$4,936
TOTAL COST											**$133,268**