

Research Report
UKTRP-88-3

EVALUATION OF ADS POLYETHYLENE PIPE -- N-12

by

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16. Abstract Construction and performance evaluations of ADS Polyethylene Pipe N-12 are presented. Construction procedures and visual inspection data are included. The pipe appears to be performing well.					
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INTRODUCTION

This report documents the installation and performance of N-12 pipe installed during construction of South Forbes Road in Lexington, Kentucky. The pipe is manufactured by Advanced Drainage Systems, Inc., and is designated as ADS N-12. ADS N-12 is a corrugated high-density polyethylene (HDPE) pipe. The pipe has a corrugated exterior for increased strength and smooth interior to provide maximum flow capacity and rigidity.

The purpose of the study was to evaluate the performance of the pipe during construction and after placement.

CONSTRUCTION

ADS N-12 was installed in two locations along South Forbes Road. Location of the study area is shown in Figure 1. Figure 2 is a photograph of the area. The first location was 28 feet right of Station 6+54. The 15-inch N-12 is used as an entrance pipe. The entrance pipe was backfilled with approximately 1 foot of material. The second location starts at a storm sewer inlet and runs 240 feet north to a manhole; this N-12 is used as a 15-inch culvert pipe. The culvert was installed to a depth of approximately 6 feet. The pipe was backfilled with No. 9 stone to approximately 1 foot above the top of the pipe. The remainder of the trench was backfilled to grade elevation with excavated material (Figures 3 and 4). The No. 9 stone was used because, it was readily available, gives stronger lateral and vertical support, and is easier to install than a soil backfill.

Elevations were taken on November 19, 1987, on the final backfill heights. The 15-inch culvert had approximately 3.4 feet of fill at the

south end near the inlet to the storm sewer. The north end near the manhole box had approximately 6 feet of fill. Elevations on the culvert indicated a final grade of 2.6 percent. At that time, there were no indications of further consolidation of the backfill material.

VISUAL INSPECTION

During a visual inspection of the N-12 on November 19, 1987, random measurements were taken of the internal diameter of both pipes. The measurements indicated that there had been little to no distortion of the pipe diameter since construction (Figures 5 through 8).

The pipes also were inspected for chemical or physical deterioration or defects. The inlet, outlet, and manholes were examined and photographed; there were no signs of deterioration or weakening of the N-12 pipe (Figure 9 and 10).

Both drainage systems were inspected for potential clogging. The culvert showed no signs of clogging. The entrance pipe had approximately 2 inches of organic material in the first 6 inches of the inlet and the outlet. The accumulation of material in the outlet end seemed to be due to inaccurate excavation of the trench at the outlet end.

CONCLUSION

Visual inspections indicated there were no major problems encountered during installation. Both pipes appear to be performing well. This is probably not an ideal test section for the N-12 pipe. The service road over the entrance pipe appears to be used infrequently,

is seldom under heavy loads, and the backfill over the culvert pipe is not sufficiently substantial to fully test the compressive strength of the N-12.

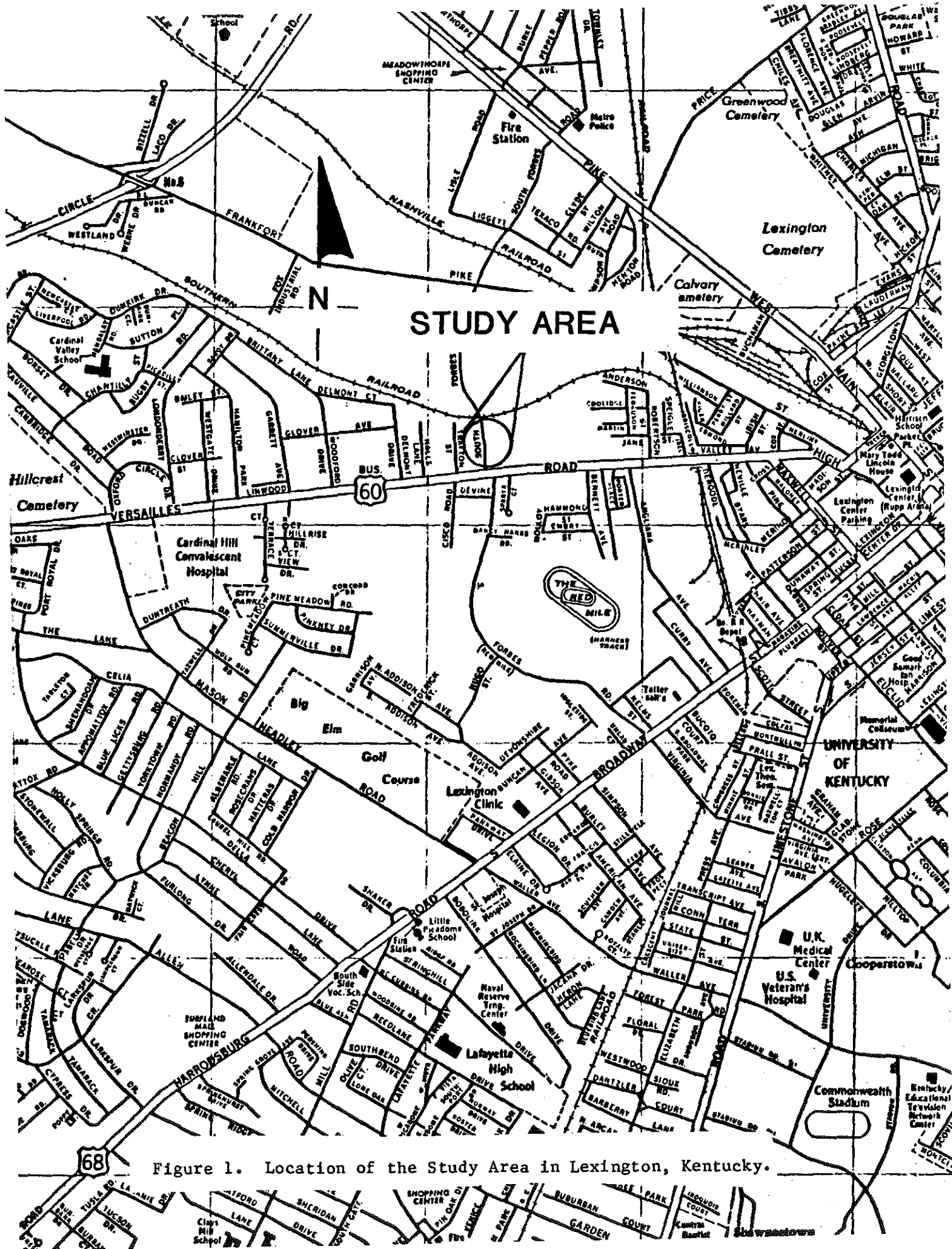


Figure 1. Location of the Study Area in Lexington, Kentucky.



Figure 2. Location of the Study Area on South Forbes Road.



Figure 3. No. 9 Stone.



Figure 4. Backfill over Culvert Pipe.

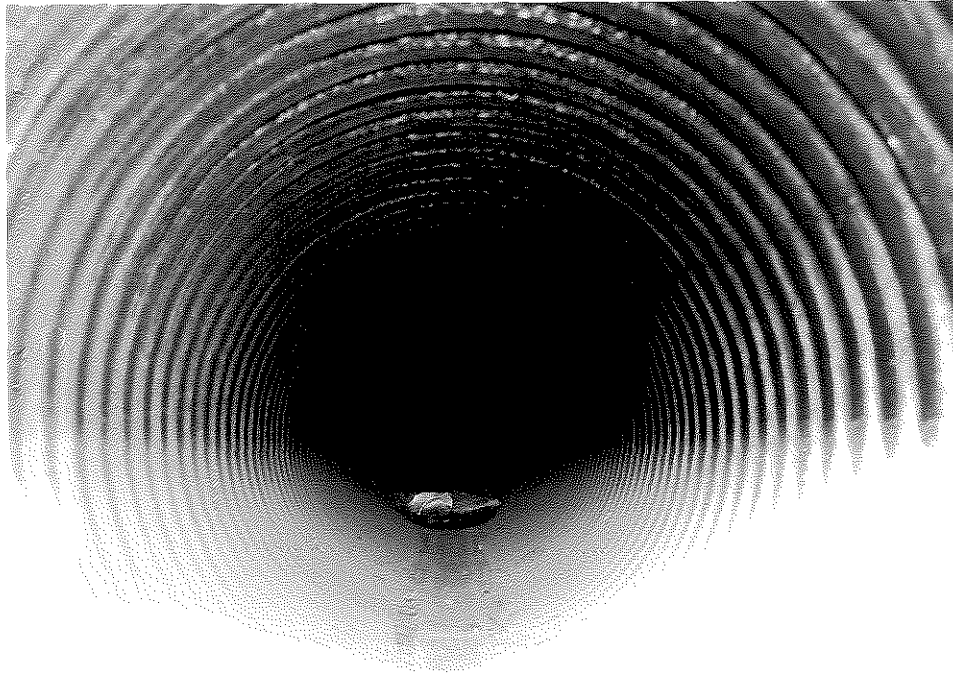


Figure 5. Culvert Pipe Viewed from the Inlet.

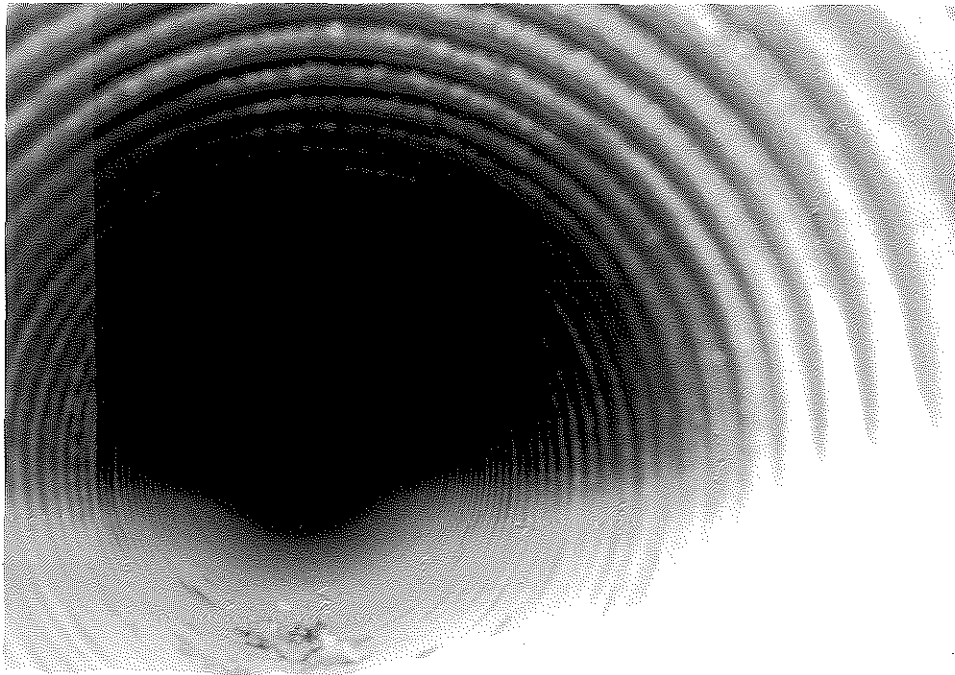


Figure 6. Culvert Pipe Viewed from the Outlet.



Figure 7. Inlet of Entrance Pipe.

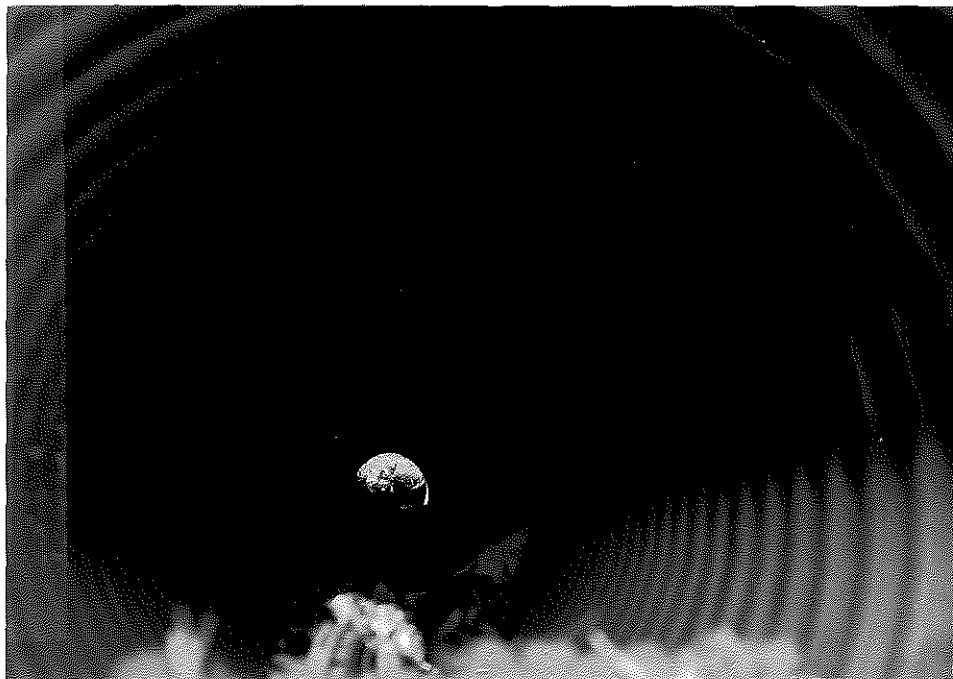


Figure 8. Entrance Pipe Viewed from the Outlet.



Figure 9. Culvert Inlet.



Figure 10. Culvert Outlet.

APPENDIX A

SHORT FORM SPECIFICATIONS FOR A.D.S. N-12 PIPE

A.D.S. N-12 PIPE

SMOOTH INTERIOR CORRUGATED POLYETHYLENE SEWER PIPE
SHORT FORM SPECIFICATION

DATE: MARCH 3, 1987

This specification applies to A.D.S. N-12 high density polyethylene corrugated pipe with an integrally formed smooth interior.

(a) GENERAL- This specification currently is applicable to nominal sizes 12" through 24"; however, it may later be applicable to larger sizes.

Pipe and pipe shapes (fittings) shall meet the requirements of ASTM F-667 and AASHTO M-294-851.

The pipe and fittings shall be free of foreign inclusions and visible defects. The ends of the pipe shall be cut square and cleanly so not to adversely effect joining.

(b) MATERIALS- Pipe and fittings shall be made of high density polyethylene compounds which conform with the requirements of Type III, Category 4, or 5, Grade P 33, or P 34, Class C per ASTM-1248, with applicable requirements per ASTM D -1248.

(c) DESCRIPTION- Terms used for the definition of Corrugated Polyethylene Pipe shall be governed by ASTM D-883 and ASTM D-412.

(d) DIMENSIONS- The nominal size of the pipe and fittings shall be based on the nominal inside diameter of the pipe. Inside diameter tolerances shall be plus 3% minus 1.5%. Dimensions shall be determined as governed by AASHTO M-294-851. ASTM D-2122.

(e) FITTINGS- Corrugated fittings may be either molded or fabricated by the manufacturer. The use of fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the owner.

(f) COUPLINGS- Couplings shall be corrugated to match the pipe corrugations and the width shall not be less than half the nominal diameter of the pipe. Split couplings shall be manufactured to engage an equal number of corrugations on each side of the pipe joint.

(g) TESTING- Testing for Corrugated Polyethylene Pipe shall be those found in AASHTO M-294-851 and ASTM as follows:

- ASTM D-618 conditioning for plastics for testing
- ASTM D-2412 external loading by parallel plate method
- ASTM D-1693 test method for environmental stress cracking
- ASTM D-2444 impact resistance
- ASTM D-543 test method for chemical resistance
- ASTM D-2412 pipe stiffness minimum stiffness as follows:

Diameter	Pipe Stiffness
12"	45psi
15"	42psi
18"	40psi
24"	34psi

(h) MARKINGS- Markings requirements are those found in AASHTO M-294-851.

(i) CERTIFICATION- Manufacturers certification that the product is manufactured, tested and supplied in accordance with this specification shall be furnished upon request by the owner or project engineer.

(j) INSTALLATION- Installation shall be in accordance with ASTM D-2321 recommended practice unless otherwise approved by the project engineer.

Bedding and backfill DO NOT require the use of imported gravel; however they do require select native soil meeting Class I, II, or III. Class IV soil may be borderline depending on the moisture content. Good engineering practice may warrant importing soil if native soils are Class IV or V. Backfill should be placed in approximately 8" lifts with compaction to minimum 90 % AASHTO density.

APPENDIX B
N-12 "FACT SHEET"

ADVANCED DRAINAGE SYSTEMS, INC
N-12 PIPE
"FACT SHEET"

Attribute	Nominal Diameter (I.D.)			
	12"	15"	18"	24"
Weight				
Pounds/Foot	3.7	4.6	7.5	11.5
Pounds/20' Length	74.0	92.0	150.0	230.0
Inside Diameter (Nominal)	12.25"	15.30"	18.16"	24.53"
Outside Diameter (Nominal)	14.10"	17.80"	21.25"	28.35"
Wall Thickness (Nominal)	.070"	.075"	.090"	.115"
Pipe Stiffness 5% Deflection	Min. 45 PSI	Min. 42 PSI	Min. 40 PSI	Min. 34 PSI
Marking	ADS®12" I.D. N-12™ AASHTO M294 Plant, Month, Day, Year, and Shift of Mfg.	ADS®15" I.D. N-12™ AASHTO M294 Plant, Month, Day, Year, and Shift of Mfg.	ADS®18" I.D. N-12™ AASHTO M294 Plant, Month, Day, Year, and Shift of Mfg.	ADS®24" I.D. N-12™ AASHTO M294 Plant, Month, Day, Year, and Shift of Mfg.