Performance Report on Corrugated Polyethylene Pipe, N-12

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PERFORMANCE REPORT
ON CORRUGATED
POLYETHYLENE PIPE, N-12

by

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Engineering Geologist

and

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Kentucky Transportation Center
College of Engineering
University of Kentucky
Lexington, Kentucky

in cooperation with
Transportation Cabinet
Commonwealth of Kentucky

The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the University of Kentucky, the Kentucky Transportation Cabinet, nor the Federal Highway Administration. This report does not constitute a standard, specification, or regulation. The inclusion of manufacturer names and tradenames are for identification purposes and are not to be considered as endorsements.

June 1990
EXECUTIVE SUMMARY

This paper documents the installation and performance of N-12 pipe installed during construction of South Forbes Road in Fayette County, KY 54 in Daviess County, US 62 in McCracken County, Nicholasville Road in Fayette County, and US 68/KY 80 in Warren County. 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 a smooth interior to provide maximum flow capacity.

The N-12 pipe requires less equipment and fewer personnel than steel or concrete pipe for installation. From visual observations at all five sites, extreme care should be taken during backfilling around the pipe above the bedding material. On US 62, KY 54, and US 68/KY 80 the pipes were not completely covered with bedding material. Cuts or tears were found inside the N-12 pipe (5 total). It appears that the tears are occurring where the sections of plastic are wrapped together to form the pipe. The rips are probably occurring due to improper backfilling and unequal loading of the pipe wall. On Forbes Road and Nicholasville Road, the pipes were completely covered with one foot of either sand or crushed stone before the excavated material was placed as backfill. This one-foot cover helps protect the pipe against backfill damage. In several installations, it was apparent the ends of the pipes at the couplings were rarely butted completely together. This permits material to be deposited in those areas. Care should also be taken during construction not to damage the plastic pipe during transportation. Due to the fact the N-12 is lightweight, the pipe has a tendency to rise or drift during backfilling. To eliminate this, the contractors bed each side equally to approximately 1/2 to 3/4 of the pipe height before compacting (depends greatly on the backfill material).
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INTRODUCTION

This report documents the installation and performance of N-12 pipe installed during construction of South Forbes Road in Fayette County, KY 54 in Daviess County, US 62 in McCracken County, US 68/KY 80 in Warren County and Nicholasville Road in Fayette County. 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 a smooth interior to provide maximum flow capacity.

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

FORBES ROAD INSTALLATION

In November 1987, the first section of N-12 pipe installed in Kentucky was along Forbes Road in Fayette County. The pipe was installed in two locations. The first was 15 inches in diameter and was installed 28 feet right of Station 6+54. The 15-inch N-12 was used as an entrance pipe (very seldom loaded). The entrance pipe was backfilled with approximately one 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 (Figure 1). The pipe was backfilled with No. 9 stone to approximately one foot above the top of the pipe. The remainder of the trench was backfilled to grade elevation with excavated material. The maximum fill height was approximately 6 feet.

The pipe was visually inspected on November 19, 1987, and September 21, 1989. Random measurements were taken of the internal diameter of both pipes. Measurements indicated there had been little to no distortion of the pipe since construction.

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.

KY 54, DAVIESS COUNTY

Construction Inspection

During the relocation of KY 54, in Daviess County, approximately 468 feet of 15-inch N-12, and 592 feet of 18-inch N-12 were installed.

The project begins at Station 93+81.17 and ends at Station 152+00. The first section of N-12 pipe was placed May 18, 1988, at Station 137+88. Approximately 104 feet of 18-inch N-12 were placed at that location. The trench was backfilled with a coarse and clean sand approximately midway up the pipe and compacted with a vibratory tamper. The remainder of the trench was backfilled with excavated material (Figure
2). The excavated material was alluvial by nature (sandy silt). Prior to installation, it was observed that a number of the pipe sections had been cut during construction. It appeared that the sections had been damaged during transport with a backhoe. The damaged sections were returned to the manufacturer for inspection (Figure 3).

**Monitoring Points**

Two sets of monitoring points were placed in the pipe at Station 137+88 prior to installation. The monitoring points were placed at 41 feet and 61 feet from the outlet. The points were monitored three times during 1988 and on September 18, 1989. Since installation, the interior of the pipe at 61 feet had deflected approximately 0.42 inch, and approximately 0.25 inch at 41 feet (Figures 4 and 5). The fill height above the 61-foot monitoring point was 6 feet, and the fill height at the 41-foot monitoring point was 8 feet.

Monitoring points were also placed at Station 122+50. Since installation, the interior of the 18-inch pipe has deflected 0.34 inch (Figure 6). Eight additional monitoring points were placed in the pipes prior to installation. Due to water and mud, the monitoring points could not be accessed during the last inspection.

**Visual Inspection**

All pipes, including the 18-inch and 15-inch pipe were inspected and photographed. All appeared to be symmetrical. On June 18, 1988 during the inspection of the 104-foot, 18-inch pipe at Station 137+88, a rip or cut was noted in the smooth interior lining of the pipe. The rip follows one of the corrugations and is approximately seven inches in length (Figure 7). The rip was closely inspected again on September 18, 1989. The rip appeared to be approximately the same length and had bulged approximately one-half inch.

The interior of a 216-foot, 18-inch pipe was inspected in detail on September 19, 1989, from Station 126+00 to 128+20. Each 20-foot section was photographed and visually inspected. The pipe appeared to be clean and symmetrical. A four-inch gap was discovered between the first and second section south of Station 128+20 (Figure 8). It was apparent that the sections were not completely butted together at the time of installation. All other joints were inspected and their conditions were recorded. The next largest separation was one inch. A one-half inch separation at joints was fairly common throughout the pipe section.

**US 62, McCracken County**

During 1989-1990, approximately 652 feet of N-12 pipe was installed during a reconstruction of US 62 from two lane to four lane. As shown in Table 1, the sizes of pipe installed were 15, 18, 24, and 30 inches. The majority of the pipe is being used as entrance pipes for local residences. On September 18, 1989, all entrance and culvert pipes were visually inspected and photographed. Several of the pipes showed
signs of deflection. It appears the pipes had deformed during backfill operations. Appendix A is an inspection log for each pipe.

On March 13, 1990, all pipes were visually inspected, photographed, and deflection measurements were taken. Contained in Appendix B is an inspection log of each pipe. Through further observation it appears that culvert pipes (cross drains) are functioning well with little notable deflection. The N-12 pipe used as entrance pipe appears to be deflecting considerably more than pipe use for culverts (Figure 9). It appears that the entrance pipes are deflecting due to shallow fill heights, weak backfill material, and traffic loading. A 9-inch deep, 1.5-foot long compression failure was observed in an 18-inch pipe located under a concrete driveway (Figure 10).

**US 68/KY 80, WARREN COUNTY**

In 1989, a contract was awarded for the widening of US 68/KY 80. Included in this contract was the installation of N-12 pipe. As shown in Table 1, approximately 7,080 feet of N-12 pipe will be installed. The pipe will be used predominately as storm drains and cross drains. As of May 15, approximately half of the pipe had been installed. Monitoring points were marked inside the pipes on November 28, 1989 while the pipes were stockpiled. A puncture was observed inside one of the 36 inch pipes. The puncture passed through the outside corrugations and through the smooth interior lining.

A construction and monitoring inspection was performed on December 12, 1989, January 11, and February 21, 1990. The pipe was being backfilled with No. 11 stone to an elevation approximately 3/4 up the height of the pipe. The material was being compacted with vibratory compactors. On December 12, 1989, the remaining trench was backfilled with the excavated material which consisted of frozen red to brown clay and rock (Figure 11). According to Section 612.05 of "The Kentucky Standard Specifications For Road And Bridge Construction", the fill material should be free of rocks larger than 3 inches and is not to contain frozen clods of soil. A large section of 36-inch pipe was visually inspected and deflection measurements were obtained (Table 2). As shown in Table 2, there is only moderate pipe deflection.

On April 18, 1990, deflection measurements were obtained on other sections of 36-inch and 24-inch pipe (Table 2). During the inspection, a tear approximately 6 inches long was observed in a 24-inch pipe. The pipe had deflected 3 inches, approximately 45 degrees off vertical. The tear had occurred in one of the inside spiral corrugations. It appears to have been caused by a rock in the backfill. Two tears were observed inside the N-12 pipe in Warren County. It appears the tears are occurring where the sections of plastic are wrapped together to form the pipe. The tears may be occurring due to improper backfilling and unequal loading of the pipe. It appears that large rocks or large clods are becoming lodged against the pipe during backfilling operations.
NICHOLASVILLE ROAD, FAYETTE COUNTY

Approximately one mile of N-12 pipe is being installed during a widening project on Nicholasville Road in Fayette County (Figure 14). As of May 17, 1990, approximately one half of the pipe has been installed. The pipe is being used as cross drains and storm drains. The trench around the pipe is being backfilled with No. 9 stone to an elevation approximately 1 foot above the pipe. The remainder of the trench is being backfilled with excavated material (red/brown clay). There were no visual signs of deflection during a visual inspection conducted on May 17, 1990. The pipe appeared to be in excellent condition.

DISCUSSION

The N-12 pipe requires less equipment and fewer personnel than metal or concrete pipe for installation. Extreme care should be taken during backfilling around the pipe. On US 62, KY 54, and US 68/KY 80, the pipes were not completely covered with bedding material. Cuts or tears were observed inside the N-12 pipe (5 total). It appears that the tears are occurring where the sections of plastic are wrapped together to form the pipe. The rips are probably occurring due to improper backfilling and unequal loading of the pipe wall. On Forbes Road and Nicholasville Road, the pipes were completely covered with one foot of sand or crushed stone before the remainder of the trench was backfilled with excavated material. This one foot of cover helps to protect the pipe against backfill damage. On several of the installations, it was apparent the ends of the pipes at the couplings are rarely butted completely together. This permits material to be deposited in this area. Care should be taken not to damage the plastic pipe during transportation.

CONCLUSION

Due to the lightness of the polyethylene, the N-12 pipe has a tendency to rise of drift during backfilling. To eliminate this the contractors bed each side equally to approximately 1/2 to 3/4 of the pipe height before compacting (depends greatly on the backfill material).

Select backfill should be provided up to 1 foot over the crown of the culvert.
Table 1.

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<thead>
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<th>Location</th>
<th>Diameter (inches)</th>
<th>Quantity (feet)</th>
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Figure 1. Backfill around 15-inch culvert (Forbes Road).

Figure 2. Compacting sand backfill around 18-inch culvert (KY 54).
Figure 3. Damaged 18-inch N-12 pipe (KY 54).
Figure No. 4: 18-Inch N-12
Ky 54, Daviess County, Station 137+88

Diameter in inches

61 feet from the outlet

Time (days)
Figure No. 5: 18-Inch N-12 Pipe
Ky 54, Daviess County, Station 137+88

Pipe Diameter / Inches

Diameter in inches

Horizontal

Vertical

41 feet from the outlet

Time (days)
Figure No. 6: 18-Inch N-12
Ky 54, Daviess County, Station 126+00

Diameter in inches

Horizontal

Vertical

Time (days)
Figure 7. Rip or cut inside an 18-inch pipe (KY 54).

Figure 8. Four-inch separation between the two connecting pipe ends at the coupling (KY 54).
Figure 9: 18-Inch N-12 pipe, US 62, McCracken Co. Station 180+00, Entrance Pipe
Figure 10. Failure within 18-inch entrance pipe (US 62).

Figure 11. Backfilling of 15-inch culvert pipe (US 68/KY 80).
Soil appears to be clodded and frozen.
APPENDIX A
US 62 N-12 PIPE INSPECTION
SEPTEMBER 18, 1989
<table>
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<th>SITE</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>No. 1</td>
<td>18-inch entrance pipe slightly irregular.</td>
</tr>
<tr>
<td>No. 2</td>
<td>24-inch entrance pipe (Station 174+00). Approximately 2.3 inches of deflection at the pipe connection. Some settlement observed in the gravel drive above the pipe. Approximately 1.5 feet of cover at the south end of the pipe, south side of the gravel drive. The pipe sections are not completely connected.</td>
</tr>
<tr>
<td>No. 3</td>
<td>18-inch entrance pipe (Station 167+50). The pipe has approximately 3 inches of cover at 6 feet north of the south end. Approximately 2 inches of compression noticeable at this point. Endloader tracks are also present on the surface at this point.</td>
</tr>
<tr>
<td>No. 4</td>
<td>18-inch entrance pipe (Station 161+50). Slight bow present at the joint in the pipe. Overall installation looks good. Asphalt surface has been placed within 1 to 2 inches of the top of the pipe.</td>
</tr>
<tr>
<td>No. 5</td>
<td>18-inch entrance pipe (Station 151+00-Highland Road). The installation is in good condition.</td>
</tr>
<tr>
<td>No. 6</td>
<td>24-inch entrance pipe (Station 138+50). Approximately 2 inches of compression on the south end. Approximately 4 to 4.5 feet of fill. Pipe does not appear to be bedded on sand or crushed stone.</td>
</tr>
<tr>
<td>No. 7</td>
<td>24-inch culvert pipe (Station 134+50). Good installation.</td>
</tr>
<tr>
<td>No. 8</td>
<td>30-inch culvert pipe (Station 124+50). Slight vertical deflection approximately 25 inches from the east end. Fairly good shape.</td>
</tr>
<tr>
<td>No. 9</td>
<td>15-inch entrance pipe (Station 121+00). Truck entrance for Turner Dairy. Half full of soil. Not much deflection.</td>
</tr>
<tr>
<td>No. 10</td>
<td>15-inch entrance pipe (Station 111+00). Half full of soil. Little to no deflection.</td>
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APPENDIX B
US 62 N-12 PIPE INSPECTION
MARCH 13, 1990
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<tr>
<td></td>
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<td>(Horizontal)</td>
</tr>
<tr>
<td>No. 1</td>
<td>18-inch entrance pipe (Station 180+00).</td>
<td>15.12&quot;</td>
</tr>
<tr>
<td>No. 2</td>
<td>24-inch entrance pipe (Station 174+00). Approximately 3-4 inches of deflection. Not able to measure due to sediment. New concrete drive.</td>
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</tr>
<tr>
<td>No. 3</td>
<td>18-inch entrance pipe to field (Station 167+50). Backfill has been washed away.</td>
<td>16.87&quot;</td>
</tr>
<tr>
<td>No. 4</td>
<td>18-inch entrance pipe (Station 161+50).</td>
<td>17.0&quot;</td>
</tr>
<tr>
<td>No. 5</td>
<td>18-inch entrance pipe (Station 151+00-Highland Road). The installation is in good condition.</td>
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</tr>
<tr>
<td>No. 6</td>
<td>24-inch entrance pipe (Station 138+50).</td>
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<tr>
<td>No. 7</td>
<td>24-inch culvert pipe (Station 134+50).</td>
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<td>No. 8</td>
<td>30-inch culvert pipe (Station 124+50).</td>
<td>29.5&quot;</td>
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<tr>
<td>No. 9</td>
<td>15-inch entrance pipe (Station 121+00). New concrete drive has been recently installed. Approximately 2 inches of deflection in the pipe.</td>
<td></td>
</tr>
<tr>
<td>No. 10</td>
<td>15-inch entrance pipe to field (Station 111+00). Fence blocking access. Pipe appears to be in good shape.</td>
<td></td>
</tr>
<tr>
<td>No. 11</td>
<td>18-inch entrance pipe to residence with new concrete drive. Indentation in pipe approximately 1.5 feet in length.</td>
<td>9.25&quot;</td>
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EXPERIMENTAL PROJECT REPORT

<table>
<thead>
<tr>
<th>EXPERIMENTAL PROJECT NO.</th>
<th>CONSTRUCTION PROJ. NO.</th>
<th>LOCATION</th>
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<tbody>
<tr>
<td>RS 5009 (9)</td>
<td></td>
<td>Blandville Road McCracken Co.</td>
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### SHORT TITLE
Performance Report on Corrugated Polyethylene Pipe, N-12

### DATE REPORTING
**DATE NO. YR. REPORTING**
- **NO. YR.**
  - **10-9**

### KEY WORDS
- **KEY WORD 1:** Drainage
- **KEY WORD 2:** Pipes
- **KEY WORD 3:** Plastic
- **KEY WORD 4:**

### CHRONOLOGY
- **Data Work Plan Approved:**
  - **MO. YR.**
  - **3-8-9**
- **Date Material Constructed:**
  - **MO. YR.**
  - **9-8-9**
- **Evaluation Scheduled Units:**
  - **MO. YR.**
  - **265**
- **Evaluation Extended Units:**
  - **MO. YR.**
  - **255**
- **Date Evaluation Terminated:**
  - **MO. YR.**
  - **253**

### QUANTITY AND COST
- **QUANTITY OF UNITS (Rounded to whole numbers):**
  - 111116.1512
- **UNIT COST (Dollars, Cents):**
  - See Remarks

### AVAILABLE EVALUATION REPORTS
- **Construction Problems:**
  - 1. None
  - 2. Slight
  - 3. Moderate
  - 4. Significant
  - 5. Severe
- **Performance:**
  - 1. Excellent
  - 2. Good
  - 3. Satisfactory
  - 4. Marginal
  - 5. Unsatisfactory
- **Application:**
  - 1. ADOPTED AS PRIMARY STD.
  - 2. PERMITTED ALTERNATIVE
  - 3. ADOPTED CONDITIONALLY
  - 4. EXPENDING
  - 5. REJECTED
  - 6. NOT CONSTRUCTED

### EVALUATION
- **REMARKS**
  - Ent. Pipe 18", 56ft, $17.50 LF
  - Ent. Pipe 24", 28ft, $23.50 LF
  - Ent. Pipe 15", 224ft, $15.50 LF
  - Culv. Pipe 15", 48ft, $21.50 LF
  - Culv. Pipe 18", 56ft, $21.50 LF
  - Culv. Pipe 24", 116ft, $25.50 LF
  - Culv. Pipe 30", 124ft, $34.50 LF
# EXPERIMENTAL PROJECT REPORT

## Experimental Project
- **State Year Number Suf.**
  - K V S 0 0 2 A
- **Construction Proj. No.**
  - M 8540 (3)
- **Location**
  - S. Forbes Road
  - Fayette Co.

## Short Title
Performance Report on Corrugated Polyethylene Pipe, N-12

## Title
- **Date Reporting**
  - 01-09-89
- **Initial**
- **Annual**
- **Final**

## Key Words
- **Key Word 1**
  - Drainage
- **Key Word 2**
  - Pipes
- **Key Word 3**
  - Plastic
- **Unique Word**
  - ADS-N-12
- **Proprietary Feature Name**
  - Proprietary Feature

## Chronology
- **Date Work Plan Approved**
  - 01-07-87
- **Data Feature Constructed**
  - 01-09-87
- **Evaluation Scheduled Until**
  - 01-09-89
- **Evaluation Extended Until**
  - 01-09-89
- **Data Evaluation Terminated**
  - 01-22-89

## Quantity and Cost
- **Units**
  - 1216 ft
- **Quantity**
  - 1111
- **Cost (Dollars, Cents)**
  - 1216 ft

## Available Evaluation Reports
- **Construction Problems**
  - None
  - Slight
  - Moderate
  - Significant
  - Severe

## Evaluation
- **Performance**
  - Excellent
  - Good
  - Satisfactory
  - Marginal
  - Unsatisfactory

## Application
- **ADOPTED AS PRIMARY STD.**
- **PERMITTED ALTERNATIVE**
- **ADOPTED CONDITIONALLY**
  - 1.4, 8, or S

## Remarks
The 15 inch N-12 was used as a 28 foot entrance pipe, and a 240 foot culvert pipe.
## EXPERIMENTAL PROJECT REPORT

### EXPERIMENTAL PROJECT
- **NO.** CF 154-41
- **STATE** KY
- **YEAR** 94
- **NO. SUR.** 02
- **PROJECT NO.** 41
- **LOCATION** KY 54 Leitchfield Rd., Daviess Co.

### SHORT TITLE
Performance Report on Corrugated Polyethylene Pipe, N-12

### KEY WORDS
- **1.** Drainage
- **2.** Plastic
- **3.** Pipes
- **4.** Polyethylene

### DATE
- **MO. YR. REPORTING** 08 94

### KEY WORD NAME
ADS-N-12

### CHRONOLOGY
- **Data Work Plan Approved:** 01 94
- **Data Feature Constructed:** 06 94
- **Evaluation Scheduled Until:** 09 94
- **Evaluation Terminated:** 03 95

### QUANTITY AND COST
- **UNITS** 1
- **UNIT COST (Dollars, Cents)** See Remarks

### AVAILABLE EVALUATION REPORTS
- **CONSTRUCTION** Q
- **PERFORMANCE** Q
- **FINAL** Q

### CONSTRUCTION PROBLEMS
- 1. **NONE**
- 2. **LIGHT**
- 3. **MODERATE**
- 4. **SEVERE**

### PERFORMANCE
- 0. **EXCELLENT**
- 1. **GOOD**
- 2. **SATISFACTORY**
- 3. **MARGINAL**
- 4. **UNSATISFACTORY**

### APPLICATION
- 0. **ADOPTED AS PRIMARY BTD.**
- 1. **PERMITTED ALTERNATIVE**
- 2. **ADOPTED CONDITIONALLY**

### REMARKS

#### CONSTRUCTION PROBLEMS

1. **None**
2. **Light**
3. **Moderate**
4. **Severe**

#### PERFORMANCE

1. **Excellent**
2. **Good**
3. **Satisfactory**
4. **Marginal**
5. **Unsatisfactory**

#### APPLICATION

1. **Adopted as Primary BTD.**
2. **Permitted Alternative.**
3. **Adopted Conditionally.**

#### COST

Culvert Pipe-15 inch, 480 feet, Installed at $24.40 LF
Culvert Pipe-18 inch, 592 feet, Installed at $26.50 LF
**EXPERIMENTAL PROJECT REPORT**

<table>
<thead>
<tr>
<th>EXPERIMENTAL PROJECT NO.</th>
<th>CONSTRUCTION PROJ. NO.</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KY 9 0-0 2 E</td>
<td>F 80-1(47)</td>
<td>US 68/KY 80 Warren County</td>
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</tbody>
</table>

**SHORT TITLE**

Performance Report on Corrugated Polyethylene Pipe, N-12

**KEY WORDS**

- Drainage
- Pipe
- Plastic
- UNIQUE WORD
- ADS -N-12

**QUANTITY AND COST**

<table>
<thead>
<tr>
<th>PIPE DIA.</th>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
<th>UNIT COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 inch</td>
<td>4068 LF.</td>
<td>Culvert Pipe</td>
<td>$22.50 LF.</td>
</tr>
<tr>
<td>18 inch</td>
<td>1132 LF.</td>
<td>Culvert Pipe</td>
<td>$25.00 LF.</td>
</tr>
<tr>
<td>21 inch</td>
<td>624 LF.</td>
<td>Culvert Pipe</td>
<td>$27.00 LF.</td>
</tr>
<tr>
<td>24 inch</td>
<td>756 LF.</td>
<td>Culvert Pipe</td>
<td>$29.00 LF.</td>
</tr>
<tr>
<td>30 inch</td>
<td>64 LF.</td>
<td>Culvert Pipe</td>
<td>$30.00 LF.</td>
</tr>
<tr>
<td>36 inch</td>
<td>436 LF.</td>
<td>Culvert Pipe</td>
<td>$45.00 LF.</td>
</tr>
</tbody>
</table>

**REMARKS**

- Culvert Pipe- 15 inch, 4068 LF, $22.50 LF.
- Culvert Pipe- 18 inch, 1132 LF, $25.00 LF.
- Culvert Pipe- 21 inch, 624 LF, $27.00 LF.
- Culvert Pipe- 24 inch, 756 LF, $29.00 LF.
- Culvert Pipe- 30 inch, 64 LF, $30.00 LF.
- Culvert Pipe- 36 inch, 436 LF, $45.00 LF.
# EXPERIMENTAL PROJECT REPORT

**EXPERIMENTAL PROJECT NO.:** 0-02-02-D

**STATE YEAR NUMBER SUFFIX:** KY 90-02 D

**CONSTRUCTION PROJ. NO.:** SSP 34-0027-002-004

**LOCATION:** Nicholasville Road, Fayette Co.

**EVALUATION FUNDING:**
1. HP&R
2. CONSTRUCTION
3. DEMONSTRATION
4. IMPLEMENTATION

**NEEP NO.:** 49

**PROPRIETARY FEATURE?**
- YES
- NO

**TITLE:** Performance Report on Corrugated Polyethylene Pipe, N-12

**DATE:**
- MO: 06
- YR: 90

**REPORTING:**
- INITIAL
- ANNUAL
- FINAL

**KEY WORDS:**
1. Drainage
2. Pipes
3. Plastic

**UNIQUE WORD NAME:** ADS-N-12

**CHRONOLOGY:**
- Date Work Plan Approved: MO: 04
- Date Feature Constructed: MO: 04
- Date Feature Terminated: MO: 09

**QUANTITY OF UNITS (Rounded to whole numbers):**

<table>
<thead>
<tr>
<th>KEY</th>
<th>UNITS</th>
<th>UNIT COST (Dollars, Cents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LIN. FT.</td>
<td>See Remarks</td>
</tr>
<tr>
<td>2</td>
<td>S.Y.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>S.Y.-IN.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>C.Y.</td>
<td></td>
</tr>
</tbody>
</table>

**AVAILABILITY:**
- CONSTRUCTION
- PERFORMANCE
- FINAL

**APPLICATION:**
1. ADOPTED AS PRIMARY STD.
2. PERMITTED ALTERNATIVE
3. ADOPTED CONDITIONALLY

**REMARKS:**

- Culvert Pipe- 12 inch, 204 ft, $23.28 LF.
- Culvert Pipe- 15 inch, 732 ft, $24.14 LF.
- Culvert Pipe- 18 inch, 2400 ft, $27.26 LF.
- Culvert Pipe- 24 inch, 1460 ft, $53.34 LF.
- Culvert Pipe- 30 inch, 20 ft, $58.37 LF.
- Culvert Pipe- 36 inch, 320 ft, $86.08 LF.