

C&F  
*[Handwritten signature]*

**11 YEAR EVALUATION OF FABRIC FORM  
WITH CEMENT FLY ASH MIXTURE FOR  
EROSION AND SEDIMENT CONTROL**

**Construction Final Report Addendum  
June 1998**

---

---

**Rudy L. Brockelsby, Sr.  
Data Processing Services Coordinator II**

**Research, Development & Technology Transfer  
Oklahoma Department of Transportation  
200 N.E. 21st Street, Room 2A2  
Oklahoma City, Oklahoma 73105  
(405) 521-2671  
FAX (405) 521-6528**

# TECHNICAL REPORT DOCUMENTATION PAGE

<b>1. REPORT NO</b> OK 98(02)	<b>2. GOVERNMENT ACCESSION NO.</b>	<b>3. RECIPIENT'S CATALOG NO.</b>	
<b>4. TITLE AND SUBTITLE</b> "11 Year Evaluation of Fabric Form With Cement Fly Ash Mixture for Erosion and Sediment Control"		<b>5. REPORT DATE</b> June 1998	
		<b>6. PERFORMING ORGANIZATION CODE</b> Item No. 2110	
<b>7. AUTHOR(S)</b>  Rudy L. Brockelsby, Sr.		<b>8. PERFORMING ORGANIZATION REPORT</b>	
		<b>10. WORK UNIT NO.</b>	
<b>9. PERFORMING ORGANIZATION NAME AND ADDRESS</b> Oklahoma Department of Transportation Research, Development & Technology Transfer 200 N.E. 21st Street, Room 2A2 Oklahoma City, Oklahoma 73105		<b>11. CONTRACT OR GRANT NO.</b>	
		<b>13. TYPE OF REPORT AND PERIOD COVERED</b> Final Construction Report - Addendum	
<b>12. SPONSORING AGENCY NAME AND ADDRESS</b> Oklahoma Department of Transportation 200 N.E. 21st Street, Room 2A2 Oklahoma City, Oklahoma 73105		<b>14. SPONSORING AGENCY CODE</b>	
		<b>15. SUPPLEMENTARY NOTES</b>	
<b>16. ABSTRACT</b> Addendum to 1987 Final Report. Short brief of the construction and reference to previous recommendations, major objectives, and notation of conclusions. Findings, observations, and pictures showing long term effects to fabric form. Conclusions and recommendations for long term effects. This addendum constitutes a follow-up to Item 2114; 81-08-1, "FabricForms".  Major Conclusions: Fabric Form can be utilized with little preparatory work. Nylon resists ultraviolet radiation and bonds with the mortar mix better than the polypropylene. The pillowed effect of the fabric collects sediment, thereby encouraging vegetative growth. Weep hole should be used. Lesser slopes result in greater abrasion to the material.			
<b>17. KEY WORDS</b> Fabric Form, Erosion, Abrasion, Grout, Fly Ash		<b>18. DISTRIBUTION STATEMENT</b> No restrictions. This publication is available from the office of Research, Development & Technology Transfer, Oklahoma DOT.	
<b>19. SECURITY CLASSIF. (OF THIS REPORT)</b> Unclassified	<b>20. SECURITY CLASSIF. (OF THIS PAGE)</b> Unclassified	<b>21. NO. OF PAGES</b> 40	<b>2. PRICE</b>

SI (METRIC) CONVERSION FACTORS									
Approximate Conversions to SI Units					Approximate Conversions from SI Units				
Symbol	When you know	Multiply by	To Find	Symbol	Symbol	When you know	Multiply by	To Find	Symbol
<b>LENGTH</b>					<b>LENGTH</b>				
in	inches	25.40	millimeters	mm	mm	millimeters	0.0394	inches	in
ft	feet	0.3048	meters	m	m	meters	3.281	feet	ft
yd	yards	0.9144	meters	m	m	meters	1.094	yards	yd
mi	miles	1.609	kilometers	km	km	kilometers	0.6214	miles	mi
<b>AREA</b>					<b>AREA</b>				
in <sup>2</sup>	square inches	645.2	square millimeters	mm <sup>2</sup>	mm <sup>2</sup>	square millimeters	0.00155	square inches	in <sup>2</sup>
ft <sup>2</sup>	square feet	0.0929	square meters	m <sup>2</sup>	m <sup>2</sup>	square meters	10.764	square feet	ft <sup>2</sup>
yd <sup>2</sup>	square yards	0.8361	square meters	m <sup>2</sup>	m <sup>2</sup>	square meters	1.196	square yards	yd <sup>2</sup>
ac	acres	0.4047	hectares	ha	ha	hectares	2.471	acres	ac
mi <sup>2</sup>	square miles	2.590	square kilometers	km <sup>2</sup>	km <sup>2</sup>	square kilometers	0.3861	square miles	mi <sup>2</sup>
<b>VOLUME</b>					<b>VOLUME</b>				
fl oz	fluid ounces	29.57	milliliters	mL	mL	milliliters	0.0338	fluid ounces	fl oz
gal	gallons	3.785	liters	L	L	liters	0.2642	gallons	gal
ft <sup>3</sup>	cubic feet	0.0283	cubic meters	m <sup>3</sup>	m <sup>3</sup>	cubic meters	35.315	cubic feet	ft <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.7645	cubic meters	m <sup>3</sup>	m <sup>3</sup>	cubic meters	1.308	cubic yards	yd <sup>3</sup>
<b>MASS</b>					<b>MASS</b>				
oz	ounces	28.35	grams	g	g	grams	0.0353	ounces	oz
lb	pounds	0.4536	kilograms	kg	kg	kilograms	2.205	pounds	lb
T	short tons (2000 lb)	0.907	megagrams	Mg	Mg	megagrams	1.1023	short tons (2000 lb)	T
<b>TEMPERATURE (exact)</b>					<b>TEMPERATURE (exact)</b>				
°F	degrees Fahrenheit	(°F-32)/1.8	degrees Celsius	°C	°C	degrees Celsius	9/5+32	degrees Fahrenheit	°F
<b>FORCE and PRESSURE or STRESS</b>					<b>FORCE and PRESSURE or STRESS</b>				
lbf	poundforce	4.448	Newtons	N	N	Newtons	0.2248	poundforce	lbf
lbf/in <sup>2</sup>	poundforce per sq inch	6.895	kilopascals	kPa	kPa	kilopascals	0.1450	poundforce	lbf/in <sup>2</sup>

The contents of this report reflect the views of the author(s) who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the views of the Oklahoma Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation. While trade names may be used in this report, it is not intended as an endorsement of any machine, contractor, process, or product.

**11 YEAR EVALUATION OF FABRIC FORM  
WITH CEMENT FLY ASH MIXTURE FOR  
EROSION AND SEDIMENT CONTROL**

**Construction Final Report Addendum**

**June 1998**

**Rudy L. Brockelsby, Sr.  
Data Processing Services Coordinator II**

**Research, Development & Technology Transfer  
Oklahoma Department of Transportation  
200 N.E. 21st Street, Room 2A2  
Oklahoma City, Oklahoma 73105  
(405) 521-2671  
FAX (405) 521-6528**

# Table of Contents

Introduction .....	1
Materials and Methods .....	2
Previous Recommendations .....	5
Major Objectives From Previous Report .....	5
Previous Notes From 1987 Conclusions .....	6
Testing .....	7
Performance Evaluation & Observations .....	9
Conclusions/Recommendations .....	11
References .....	12
Appendix A (Pictures of Observations) .....	13
Appendix B (November 1997 Observation Summary) .....	19
Appendix C (Detailed Inspection Results) .....	22

## List of Illustrations

Figure 1. Section Layout .....	3
Figure 2. Typical Section .....	4
Figure 3. Trench Anchor Detail .....	4
Figure 4. Weep Hole Detail .....	4

## List of Tables

Table 1. 1986 Compression Test Results .....	7
Table 2. 1994 Compression Test Results .....	8
Table 3. 1997 Observations .....	20

## List of Illustrations (Appendix A)

Illustration 1. Overall view of project looking south .....	14
Illustration 2. Culvert at south end of ditch .....	14
Illustration 3. Weep Hole .....	15
Illustration 4. Vegetative growth in longitudinal cracks .....	15
Illustration 5. Placement around pipe .....	16
Illustration 6. Section 10 Seam separations .....	16
Illustration 7. Section 9 Cracking at seam line .....	17
Illustration 8. Wear in polypropylene .....	17
Illustration 9. Separation in polypropylene .....	18
Illustration 10. Bond in nylon seam .....	18

## **Introduction**

In 1983 the Oklahoma Department of Transportation's Research and Development Division in cooperation with the Federal Highway Administration undertook an investigation in the use of Fabric Form for erosion and sediment control, utilizing varying portland cement/fly ash grout mixtures. The site is located approximately 2 miles south of Antlers, Oklahoma on the east side of US-271.

The four-year study concluded that the use of fly ash/portland cement grout in Fabric Form is beneficial in reducing sedimentation, eliminating erosion and brush growth, and is cost effective. The fabric mat was installed under flowing water using minimal equipment and with no apparent pollution to the water.

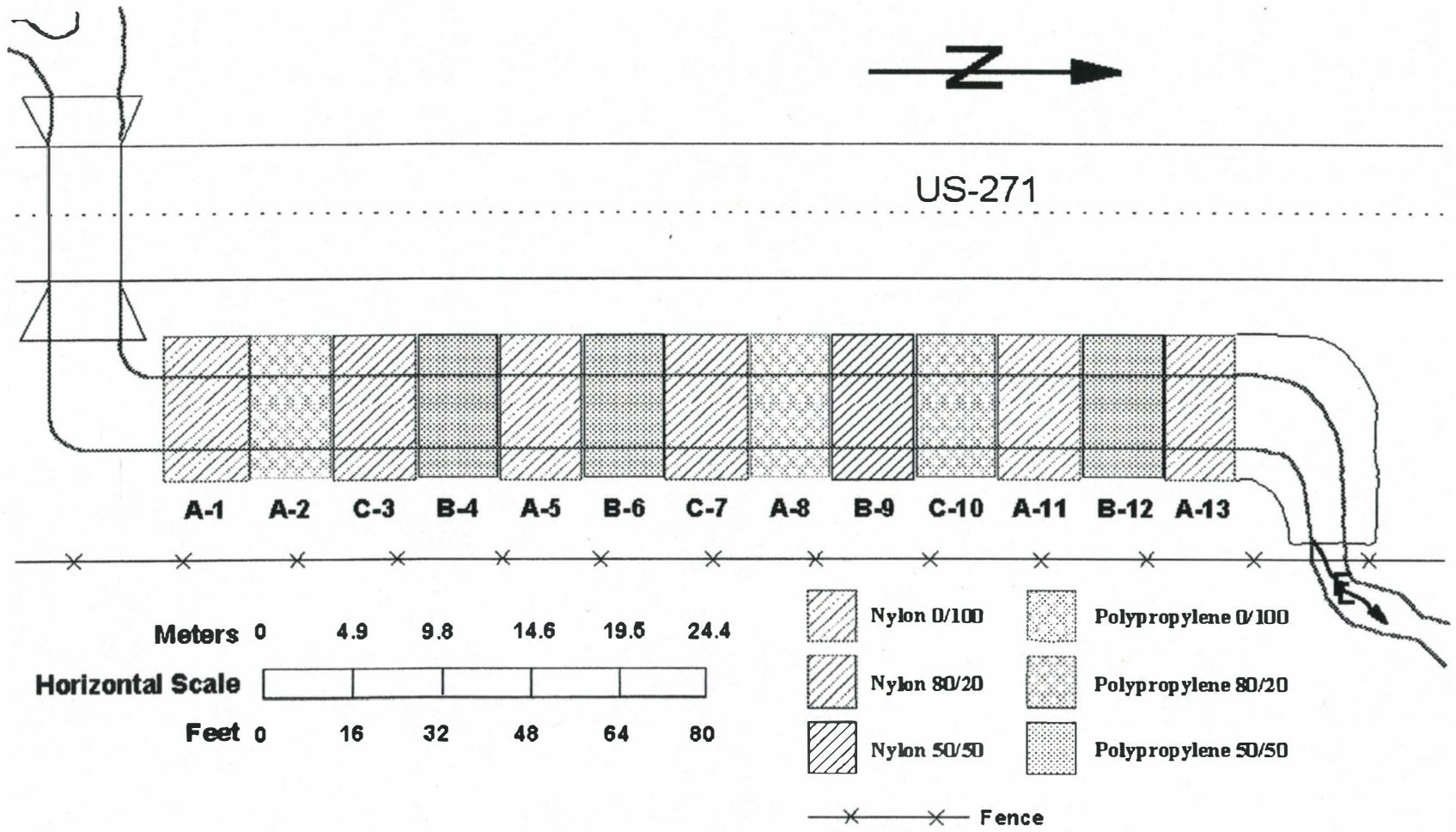
## **Materials and Methods**

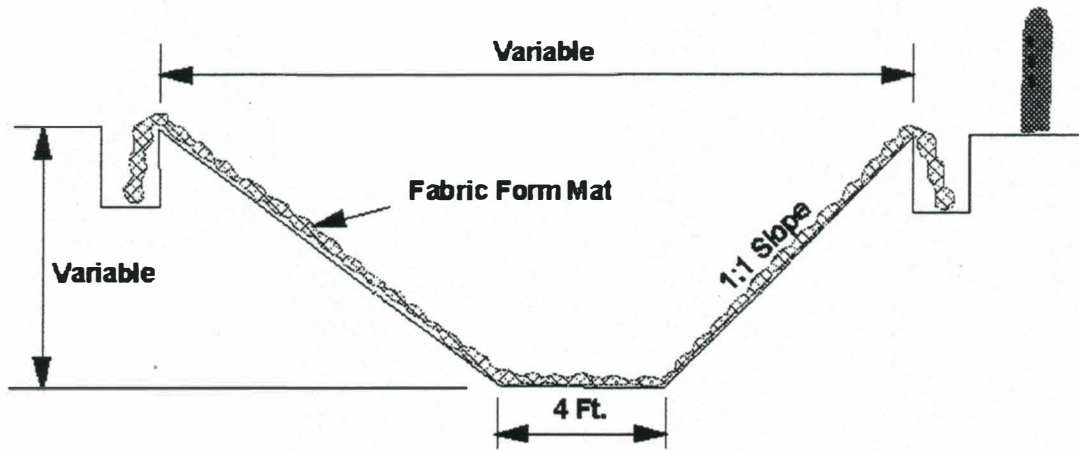
The grout mixtures were designed in three different fly ash/cement ratios, one of 50/50, one of 80/20, and one of 0/100. Usages of two different woven fabrics were incorporated to determine differences in resistance to ultraviolet deterioration, abrasion resistance, and bleeding control of excess water in the grout mixture.

The fabric mat sections were placed, alternating the Nylon and the Polypropylene material types (Figure 1). These sections (Figure 2) were then filled by pumping the grout mixtures through 'fill holes' in the mats. The tops of the mats were anchored into trenches to resist undercutting (Figure 3). Sections No. 7 through No. 11 and No. 13 utilized the addition of 'weep holes' to alleviate underlying moisture from the effects of a high water table (Figure 4).

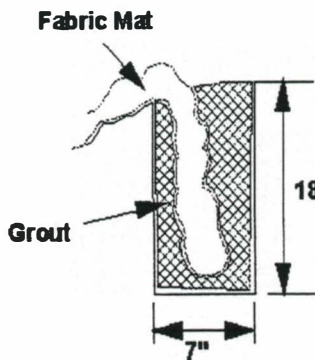


**Figure 1** Test Section Layout

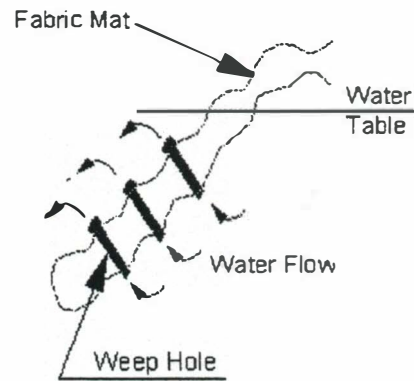




**Figure 2** Typical Section



**Figure 3** Trench Anchor Section Detail



**Figure 4** Weep Hole Section Detail

## **Previous Recommendations**

1. The fabric form site should be monitored annually and core samples taken periodically for 10 years. This will allow adequate time for a long term strength and performance evaluation of the test sections.
2. Concern about ultraviolet degradation of either fabric seems unwarranted, since both fabrics showed no visible sign of degradation in the four years since installation. It is recommended that either fabric be considered for use.

## **Major Objectives From Previous Report**

1. Ascertain the durability and economic feasibility of using a double layer of nylon and polypropylene woven fabrics as an envelope for fabric form grout.
2. Observe and document the effect of ultraviolet radiation on the two different in-situ fabrics.
3. Determine the erosion control capabilities and durability of the different mixes, including resistance to abrasion.
4. Determine the feasibility of using fabric form as a procedure for construction and for maintenance operations.

## **Previous Notes from 1987 Conclusions**

1. Several years of observations are needed to put to rest the doubt and concern about FA-PC grout durability, long term affects of freeze-thaw, abrasion resistance, flexural strength and its general usage for controlling erosion.
2. Periodic sampling and testing is necessary to establish an accurate and comparative relationship between the laboratory unconfined compression tests and the in place compressive strengths of the installed fabric form grout.

## Testing

In February of 1986, compression testing was done. The strength of each of the different grout mixtures met or exceeded minimum requirements for ditch liner. The following table shows the four year test results.

Table 1 1986 Compression Test Results

Section	Mat Type	Mixture %		Break Load	Break Load	Unit Stress	Unit Stress
		F.A.	P.C.	N	Lbs.	kPa	psi
A-1	Nylon	0	100	210835	47400	24339	3530
A-2	PP	0	100	217062	48800	25787	3740
C-3	Nylon	80	20	233520	52500	26063	3780
B-4	PP	50	50	225958	50800	31028	4500
A-5	Nylon	0	100	209056	47000	25305	3670
B-6	PP	50	50	126323	28400	15514	2250
C-7	Nylon	80	20	236634	53200	29028	4210
A-8	PP	0	100	240192	54000	29786	4320
B-9	Nylon	50	50	209946	47200	25856	3750
C-10	PP	80	20	311360	70000	38198	5540
A-11	Nylon	0	100	265990	59800	32338	4690
B-12	PP	50	50	317587	71400	37026	5370
A-13	Nylon	0	100	243750	54800	29649	4300

In October of 1994 cores were obtained from the test site. The psi results of the different grout mixtures compared favorably to the fourth year testing. Note that the 50%-50% mixture in section B-6 increased significantly in strength, as well as section A-13 with a 0%-100% mixture. Table 2 on the next page shows the test results.

Table 2 1994 Compression Test Results

Section	Mat Type	Mixture %		Break Load*	Break Load*	Unit Stress	Unit Stress
		F.A.	P.C.	N	Lbs.	kPa	psi
A-1	Nylon	0	100	-----	-----	21202	3075
A-2	PP	0	100	-----	-----	-----	-----
C-3	Nylon	80	20	-----	-----	22236	3225
B-4	PP	50	50	-----	-----	29717	4310
A-5	Nylon	0	100	-----	-----	-----	-----
B-6	PP	50	50	-----	-----	31096	4510
C-7	Nylon	80	20	-----	-----	26098	3785
A-8	PP	0	100	-----	-----	32062	4650
B-9	Nylon	50	50	-----	-----	23374	3390
C-10	PP	80	20	-----	-----	25891	3755
A-11	Nylon	0	100	-----	-----	25167	3650
B-12	PP	50	50	-----	-----	39026	5660
A-13	Nylon	0	100	-----	-----	40749	5910

\* This test not performed on 1994 specimens.

## **Performance Evaluation & Observations**

In October of 1994 a visual inspection (Appendix A) of the fabric form research project was conducted. A follow-up was conducted in November of 1997 (Appendices B and C), support the 1994 findings. The following observations were noted from the 1984 survey:

1. At the top edge where the mats were anchored into the soil, neither of the two types of mats, nylon or polypropylene, showed signs of stress or wear.
2. The nylon mats adhered to the mortar better than the polypropylene type mats.
3. The polypropylene type mats tend to separate at the sewed joints.
4. The nylon type mats bonded better at the sewed joints.
5. Surfaces of the polypropylene type mats exhibited separation and shredding of the exposed fibers.
6. Surfaces of the nylon mats displayed abrasion and wear.
7. Surface wearing seems more predominant in the lesser slopes (i.e., 4:1 as compared to 2:1 or 1:1 slopes).
8. Lateral and longitudinal cracking of varying degrees was observed in all the sections.
9. Longitudinal cracking is primarily at stress points created from the underlying soil, where increased expansion and contraction rates occur.
10. Part of the lateral cracking in the back slopes displayed staining from moisture seepage.

11. The weep holes provided a protective growing area for vegetation. There is greater vegetative growth in the areas where the nylon bags were placed, regardless of the different mortar mixes.
12. Vegetative growth was found in some longitudinal cracks in the lower 1/3 of the slopes.
13. Most of the vegetation is growing in soil accumulations gathered at the stitch-lines of the matting and in the ditch bottom.
14. Voids were found under the upper 1/4 to 1/3 of the inslope, ranging from 6.4 mm (1/2 in) upwards to 101.6 mm (4 in).



## Conclusions & Recommendations

The areas that show greater abrasion of the matting material are considered due to the weaker, (low-strength) mortar mixes and are more prevalent in the lesser sloping areas.

Long term exposure to ultraviolet radiation has a high impact on polypropylene fiber decomposition. The reduced bonding of the polypropylene mat with the mortar mixes is felt to have amplified the deterioration.

The nylon mat sections maintained overall integrity by holding each side together.

The longitudinal cracking is the most probable cause for the vegetative growth along the side-slopes of the ditch. This type of problem could be corrected by an annual or semiannual maintenance program where cracks are routed, cleaned and sealed; or use of an appropriate herbicide.

The vegetative growth in the ditch bottom is due to the collection of sediment and debris in the quilting of the mat construction.

The justification in using nylon or polypropylene type mats should be based upon:

- 1) The type of mortar mix to be used,
- 2) Cost of the materials,
- 3) Necessity for ease of placement,
- 4) Whether placement will be in direct full-sunlight.

Future projects utilizing weep holes should use a fabric cover on both the embedded and exposed ends to reduce soil collection and thus retard vegetative growth.

Considerations should be made for a joint sealant, such as silicone or an asphaltic tape in addition to sewing for increased durability.

## References

- 1) Jimmy L. Etti-Williams, Fabric Form With Cement Fly Ash Mixture for Erosion and Sediment Control, Final Report, December 1987, Oklahoma Department of Transportation, Research and Development Division in Cooperation with the Federal Highway Administration, FHWA/OK 87(8).

# **APPENDIX A**

## **PHOTOGRAPHS OF OBSERVATIONS**



Illustration 1 Overall view looking south



Illustration 2 Culvert at south end of ditch



Illustration 3 Weep hole



Illustration 4 Vegetative growth in longitudinal cracks

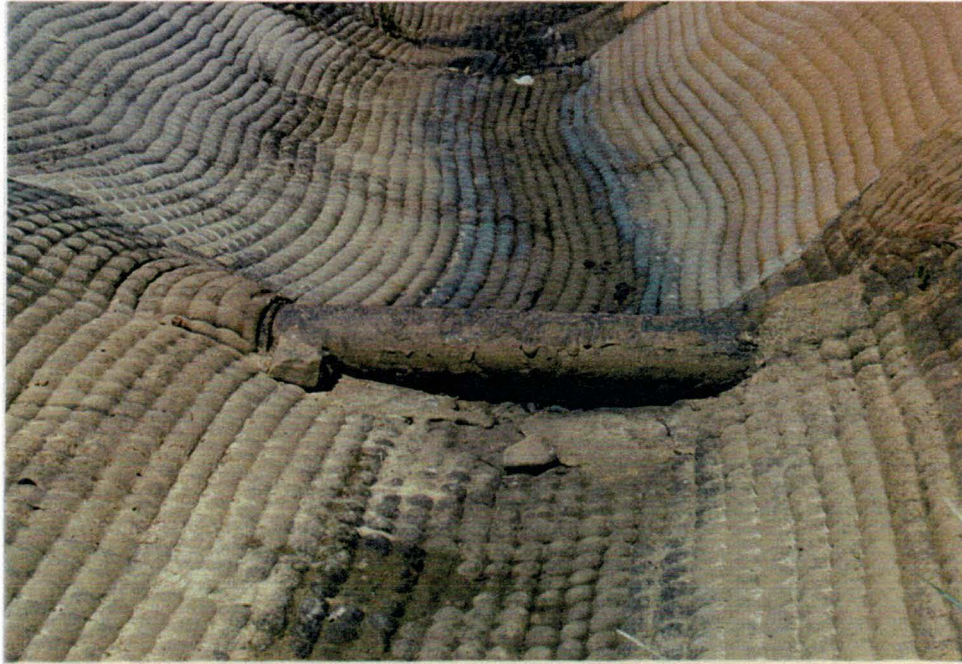


Illustration 5 Placement around pipe (Shows discoloration)



Illustration 6 Section 10 - Showing seam separation



Illustration 7 Section 9 - Showing cracking at seam line



Illustration 8 Showing wear (Polypropylene type)

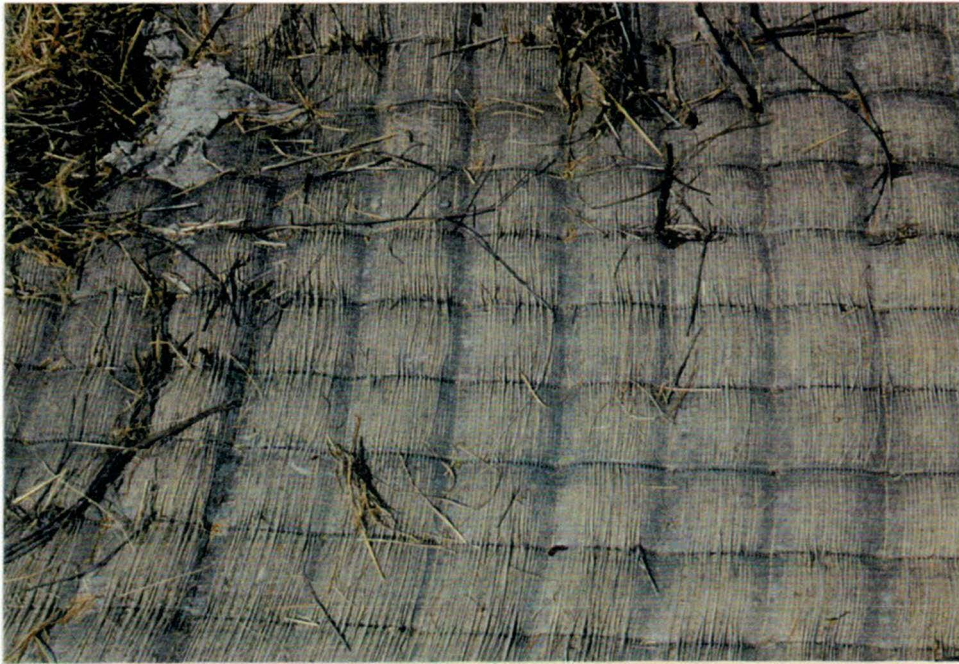


Illustration 9 Showing separation (Polypropylene type)



Illustration 10 Showing Bond (Nylon type)



**APPENDIX B**

**NOVEMBER 1997  
SUMMARY OF INSPECTION RESULTS**

Number	Fabric	Mix	Condition			Voids
			Fabric	Grout	Seam	
A-1	Nylon	1/100	Worn	Good	Signs of Stress	N/A
A-2	P.P.	1/100	75% Deterioration	V.G.	Signs of Stress	N/A
C-3	Nylon	80/20	Wear in middle	Good	Signs of Stress & Wear	N/A
B-4	P.P.	50/50	75% Deterioration	Good	Signs of Some Stress	N/A
A-5	Nylon	1/100	Wear in Upper North End	Good	Signs of Stress & Wear	N/A
B-6	P.P.	50/50	80% Shredded	Good	Good	N/A
C-7	Nylon	80/20	60% Worn	Good	Signs of Stress & Wear	Horizontal Cracks
A-8	P.P.	1/100	Shredding	Good	Good	N/A
B-9	Nylon	50/50	Minor Wear	Good	Signs of Some Wear & Stress	Horizontal Cracks
C-10	P.P.	80/20	Shredding	Good	Signs of Stress & Wear	N/A
A-11	Nylon	1/100	Worse Wear in North End	Good	Good	Horizontal Cracks
B-12	P.P.	50/50	30% Worn	Good	Good	N/A
A-13	Nylon	1/100	V.G. w/10% Wear	Good	Good	N/A

**Table 3 Summary of Inspection Results**

## Performance Evaluation & Observations

In November, 1997 a visual inspection was conducted. The following observations were noted:

1. At the top edge where the mats are anchored into the soil, neither of the two types of mats, nylon nor polypropylene, showed signs of stress or wear.
2. The nylon mats adhered to the grout better than the polypropylene mats.
3. The seams of the polypropylene sections showed signs of stress and wear.
4. The seams of the nylon sections were still in good shape.
5. The surfaces of the polypropylene sections showed separation and shredding of the exposed fibers.
6. The surfaces of the nylon sections showed some abrasion and wear.
7. The stress on the fabric seemed to be more in the lesser (flatter) slopes of each section.
8. No lateral cracking was observed in any of the sections. However, horizontal cracking was observed in sections B-9 and A-11 ( see page 3 for locations).
9. The weep holes had vegetation growing from them, in some places willow trees.
10. Most of the vegetation is growing in the creases and seams at the bottom of the ditch where two sections are sewn together.
11. There were no visual voids found.

# **APPENDIX C**

## **NOVEMBER 1997 DETAILED INSPECTION REPORTS**

NOVEMBER 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

Visual Inspection by: Glenda Goodner

Photographs by: Chuck Donovan

**Mat No.** A-1

**Fabric Type:** Nylon

**Grout Mix:** 1/100

**Upper Side Condition:** Very good

**Fabric Condition:** The fabric is worn away where the grade of the slope is less steep. The water which runs off the roadway washes small rocks, debris, etc. down over the fabric. This material acts like an abrasive causing excessive wear.

**Grout Condition:** The grout shows wear where the fabric is worn off and it is exposed to the elements. But, it is solid and without cracks here.

**Seam Condition:** They show signs of stress.

**Vegetation Growth:** Vegetation is growing at the bottom of the fabric where it crosses the ditch. Sediments filter into a crease and with moisture from the ditch it makes an ideal place for weeds and willow trees to grow. This crease runs along the whole project.

**Void(s):** This mat has no visual voids at this time.

**Core Hole(s):** One

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** A-2

**Fabric Type:** Polypropylene

**Grout Mix:** 1/100

**Upper Side Condition:** Very good

**Fabric Condition:** The fabric has deteriorated into shreds over 75 per cent of the area. The grout is exposed in this area to the elements. This mat has no cracking.

**Grout Condition:** The grout seems to be in very good condition even with the exposure where the fabric is shredded.

**Seam Condition:** The seams on this mat are showing some signs of stress especially where it is worn the most.

**Vegetation Growth:** Weeds and willow trees are growing in the crease at the bottom of the mat.

**Void:** This mat has no visual voids at this time.

**Core Hole(s):** Two

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** C-3

**Fabric Type:** Nylon

**Grout Mix:** 80/20

**Upper Side Condition:** Very good

**Fabric Condition:** This shows signs of wear in the middle where the slope is less steep. The wear is the same pattern as the other nylon mats.

**Grout Condition:** The grout is in good condition.

**Seam Condition:** The seams are showing signs of wear and stress.

**Vegetation Growth:** Vegetation is growing in the crease at the bottom of the mat.

**Voids:** No visible voids at this time.

**Core Hole(s):** Two

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** B-4

**Fabric Type:** Polypropylene

**Grout Mix:** 50/50

**Upper Side Condition:** Very good

**Fabric Condition:** The fabric has deteriorated into shreds over 75 per cent of the area, exposing the grout mix to the elements. This shredding is mainly in the areas that have a slight slope.

**Grout Condition:** The grout in this section seem to be in good condition in spite of the exposure. This section has no visual cracks.

**Seam Condition:** The seams in this section are showing some stress.

**Vegetation Growth:** This section has weeds growing in creases at the bottom of the mat.

**Voids:** This mat has no visual voids at this time.

**Core Holes:** One



November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** A-5

**Fabric Type:** Nylon

**Grout Mix:** 1/100

**Upper Side Condition:** Very good

**Fabric Condition:** This mat has more wear in the less sloping areas on the north end, worse in the upper portion.

**Grout Condition:** Good

**Seam Condition:** Shows signs of stress and wear.

**Vegetation Growth:** Vegetation is growing in creases at the bottom of the mat and any place sediments can build up.

**Voids:** This mat has no visual voids at this time.

**Core Holes:** one

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** B-6

**Fabric Type:** Polypropylene

**Grout Mix:** 50/50

**Upper Side Condition:** Very good

**Fabric Condition:** The fabric is shredded over 80 per cent of the area.

**Grout Condition:** Good in spite of being exposed to the elements.

**Seam Condition:** Good

**Vegetation Growth:** This mat has vegetation growing in the seams and creases where sediment can collect.

**Voids:** This mat has no visual voids at this time.

**Core holes:** One

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** C-7

**Fabric Type:** Nylon

**Grout Mix:** 80/20

**Upper Side Condition:** Very good

**Fabric Condition:** This mat has some bulges where the grout wasn't evenly distributed. The fabric has worn away over these bulges and in the less sloping areas. Approximately 60 per cent of the fabric is worn away.

**Grout Condition:** This section has a horizontal crack that goes the length of it. The grout shows very little wear despite the crack and being exposed to the elements where the fabric is missing.

**Seam Condition:** The seams are showing signs of stress and wear.

**Vegetation Growth:** Vegetation is growing at the bottom of the mat in a crease.

**Voids:** The horizontal crack may be caused by a void under this section.

**Core Holes:** One

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** A-8

**Fabric Type:** Polypropylene

**Grout Mix:** 1/100

**Upper Side Condition:** Very good

**Fabric Condition:** This fabric has shredding like the other polypropylene fabrics.

**Grout Condition:** The grout is ins good condition despite the shredding of the fabric exposing it to the elements.

**Voids:** This section has no visual voids at this time.

**Core Holes:** Two

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** B-9

**Fabric Type:** Nylon

**Grout Mix:** 50/50

**Upper Side Condition:** Very good

**Fabric Condition:** The fabric shows only minor wear.

**Grout Condition:** The grout is in good condition except for two cracks. The first is located approximately 1.83 meters (6 ft) down from the upper side and extends the length of the mat. The second crack is a small one, approximately 0.61 meters (2 ft) long and is located in the middle of the section.

**Seam Condition:** The seams are showing some signs of wear and stress.

**Vegetation Growth:** This section has vegetation growing along the bottom in a crease in the fabric.

**Voids:** There are no visual voids at this time. However, the cracks mentioned earlier may be caused by voids under this section.

**Core Holes:** Two

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** C-10

**Fabric Type:** Polypropylene

**Grout Mix:** 80/20

**Upper Side Condition:** Very good

**Fabric Condition:** This fabric is shredding like the other polypropylene fabrics.

**Grout Condition:** The grout seems to be in good condition.

**Seam Condition:** These seams are showing signs of stress and wear.

**Vegetation Condition:** Vegetation is growing along a crease at the bottom of this section.

**Voids:** This section has no visual voids at this time.

**Core Holes:** Two

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** A-11

**Fabric Type:** Nylon

**Grout Mix:** 1/100

**Upper Side Condition:** Very good

**Fabric Condition:** The north end of this section is worse than any other part. Debris is piled all across this section approximately six feet down from the upper side.

**Grout Condition:** The grout in this section has a crack approximately 1.83 meters (6 ft) down from the upper side that extends the length of the section. Otherwise the grout seems to be in good condition.

**Seam Condition:** The seams are in good condition.

**Vegetation Growth:** Vegetation is growing along a seam at the bottom of this section where it connects with the section laying in the bottom of the creek.

**voids:** The crack mentioned earlier may indicate voids under this section.

**Core Holes:** Two

November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** B-12

**Fabric Type:** Polypropylene

**Grout Mix:** 50/50

**Upper Side Condition:** Very good

**Fabric Condition:** Approximately 30 percent of this section is worn on the south end. This section has debris on it.

**Grout Condition:** Good

**Seam Condition:** The seam are in good condition.

**Vegetation Growth:** Vegetation is growing along the bottom of this section.

**Voids:** This section has no visual voids at this time.

**Core Holes:** Two



November 19, 1997

TO: Curt Hayes, Sr. Branch Manager

FROM: Glenda Goodner, Trans. Spec. II

SUBJECT: Letter to File, HPR-10(10) 81-08-1, Item No. 2114, Visual Inspection of Fabric Form Project at Antlers, Ok.

**Mat No:** A-13

**Fabric Type:** Nylon

**Upper Side Condition:** Very good

**Fabric Condition:** This section is in good condition. It has small worn places at the bottom, approximately 10 percent.

**Grout Condition:** Good

**Seam Condition:** Good

**Vegetation Growth:** This section has vegetation growing along the bottom.

**Voids:** This section has no visual voids at this time.

**Core Holes:** Two