

GEORGIA INSTITUTE OF TECHNOLOGY
ENGINEERING EXPERIMENT STATION

Posted
by
[signature]

PROJECT INITIATION

Date: June 26, 1975

Project Title: Open-Graded Asphalt Friction Course Lane Marking System

Project No.: A-1753

Project Director: Mr. W. H. BURROWS

Sponsor: U. S. Dept. of Trans., Federal Highway Admin.; Washington, D. C.

Agreement Period: From June 18, 1975 Until December 19, 1977

Type Agreement: Contract # DOT-FH-11-8782

Amount: \$143,935

Reports Required: Monthly Progress Reports; Interim Report; Final Report

Sponsor Contact Person:

Technical Matters

Mr. Stewart Spellman
Contract Manager
U. S. Dept. of Trans.
Federal Highway Admin.
Washington, D. C. 20590

Contractual Matters

Mr. Thomas Sullivan
Contract Administrator
U. S. Dept. of Trans.
Federal Highway Admin.
Washington, D. C. 20590

Assigned to: Technology Applications Group

COPIES TO:

Project Director
Director, EES
Director, ORA/GTRI
Assistant Director
Division Chief
EES Accounting
Patent Coordinator

EES Supply Services
Photographic Laboratory
Security—Reports—Property Office
General Office Services
Library, Technical Reports Section
Office of Computing Services
Project File
Other Sue Corbin; Bonnee Wettlaufer

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT TERMINATION

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a/s
Oth

Date: February 24, 1978

Project Title: Open-Graded Asphalt Friction Course Lane Marking System

Project No: A-1753

Tech. Appl GP.

Project Director: W. H. Burrows

Sponsor: U. S. Dept. of Transportation

Effective Termination Date: 1/31/78

Clearance of Accounting Charges: 1/31/78

Grant/Contract Closeout Actions Remaining:

Cont. DOT-FH-11-8782

- ☒ Final Invoice and Closing Documents
- ☐ Final Fiscal Report
- ☐ Final Report of Inventions
- ☒ Govt. Property Inventory & Related Certificate
- ☐ Classified Material Certificate
- ☐ Other _____

Assigned to: Technology & Development Laboratory (School/Laboratory)

COPIES TO:

Project Director
Division Chief (EES)
School/Laboratory Director
Dean/Director-EES
Accounting Office
Procurement Office
Security Coordinator (OCA) ✓
Reports Coordinator (OCA)

Library, Technical Reports Section
Office of Computing Services
Director, Physical Plant
EES Information Office
Project File (OCA)
Project Code (GTRI)
Other _____



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

August 5, 1975

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman
Contract Manager

Subject: Monthly Progress Report, Contract DOT-FH-11-8782
Open-Graded Asphalt Friction Course Lane Marketing System
Report No. 1, for the period 6/18/75 - 7/31/75

Gentlemen:

Activities for the subject period were as follows:

Phase I - Task A

Acquisition of resins and related materials for formulation studies was commenced by distribution of a letter to all manufacturers of applicable resins listed in the classified section of Modern Plastics Encyclopedia. The letter specified the application and desired application properties of the resins. Technical literature and samples of all candidate materials were requested.

Thus far, response to the letter has not been overwhelming; however, several promising materials have been proposed by manufacturers, and some samples have been received. Follow-up of all promising responses by telephone, as well as procurement from local sources is planned for the second period. Secondary materials (solvents, pigments, aggregate, antioxidants, UV screens, etc.) will be procured simultaneously.

Phase I - Task B

A priority order has been selected for the tests to be included in laboratory screening. This order would provide the maximum elimination of unsuitable materials at minimum consumption of personnel time. Access to all necessary instruments for the testing program is being arranged. Preliminary mechanical design of a device for conducting motor vehicle impact resistance tests has been discussed in several staff sessions, but design has not yet been finalized.

Schedule of Activities

The original schedule of activities for this project is shown on Page 5 of the Contract under Article VI - Schedule of Work. This schedule was proposed by us at a time when it was anticipated that the contract would be awarded approximately during the early part of January, 1975. It is predicated upon the seasonal aspects of the various phases, particularly Phase III, involving testing at highway sites during periods requiring snowplow activity. This schedule would have provided two full winters for testing (1975-76 and 1976-77) with adequate time for laboratory work beforehand.

The five month delay in award of this contract now imposes the condition that, should the original schedule be adhered to, there would be a period of six to eight months at the end of the contract during which no effective road testing could be accomplished (e.g., April through November 1977). The contract would expire in midwinter, when testing is at its best, rather than in midsummer, when testing has ceased.

Accordingly, we propose to increase the rate of effort on preliminary activities for the purpose of reaching Phase II, pilot field tests, in time for the winter season of 1975-76. If this effort is successful, it should then be possible to complete Phase III by the end of the winter season of 1976-77 and Phase IV by June 1977 (the second anniversary of project initiation).

If this revision is acceptable to the Government, the revised schedule would conform to that shown in Figure 1. A more detailed diagram of Phase I is shown in Table 1. Detailed diagrams of Phase II through IV will be prepared in cooperation with civil engineering personnel.

Respectfully submitted,



W. H. Burrows
Co-principal Investigator

WHB/rb

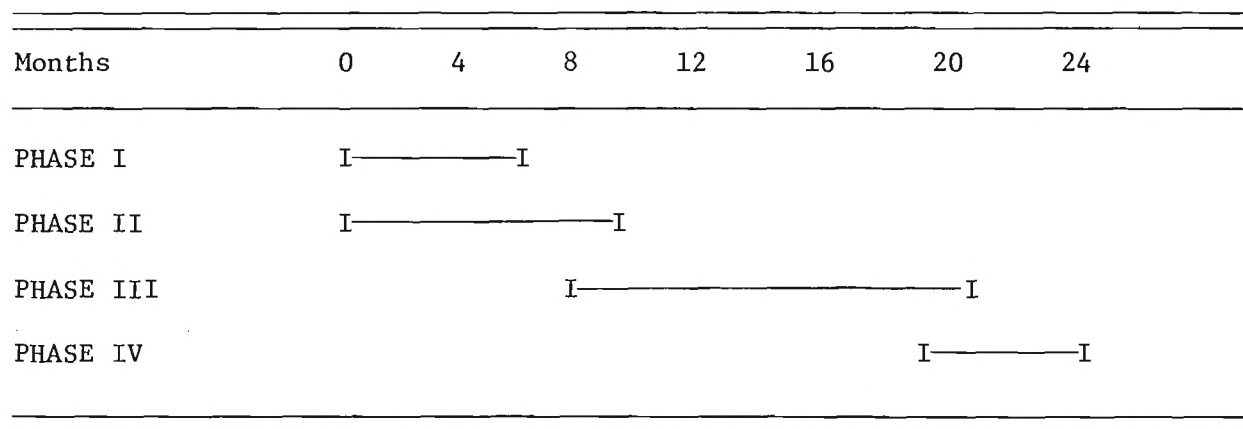


Figure 1. Revised Schedule of Activities by Phases

TABLE 1

Schedule of Activities, Phase 1

<u>Activity</u> [*]	<u>Month</u>
FORMULATIONS	
I. Resins	
A. Primary selection	1
B. Suppliers (list)	1-2
C. Sample/technical literature requests	1-2
II. Aggregates	
A. Basic information	2
B. Suppliers	2
C. Quantity order	2
III. Additives	
A. Curing agents, hardeners, etc.	2-3
B. Pigments, fillers, extenders, etc.	2-3
C. Plasticizers, antioxidants, UV absorbers, etc.	2-3
IV. Screening of materials	2-4
V. Preparation of test formulations	2-4
VI. Laboratory testing of formulations	3-5.5

* Activities are shown only by general headings. Complete details have been included in the project work program.



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

August 12, 1975

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman
Contract Manager

Subject: Monthly Financial Report, Contract DOT-FH-11-8782 for
the Period 6/18/75 through 7/31/75

Gentlemen:

Attached is the subject report for the period June 18, 1975
through July 31, 1975.

Sincerely,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Principal Research Scientist

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Attachment

MONTHLY FINANCIAL REPORT, CONTRACT DOT-FH-11-8752

For the Period 6/18/75 through 7/31/75

<u>Category</u>	<u>Budget Amount</u>	<u>Expenditures[*] This Period</u>	<u>Expenditures[*] To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance as of 7/31/75</u>
Personal Services	\$70,702.00	\$1,917.48	\$1,917.48	\$70,702.00	\$68,784.52
Retirement	4,897.00	-	-	4,897.00	4,897.00
Materials and Supplies	12,000.00	52.90	52.90	12,000.00	11,947.00
Travel	10,380.00	-	-	10,380.00	10,380.00
Total Direct Charges	97,979.00	1,970.38	1,970.38	97,979.00	96,008.62
Overhead	<u>45,956.00</u>	<u>1,212.07</u>	<u>1,212.07</u>	<u>45,956.00</u>	<u>44,743.93</u>
Total Charges and Balances	<u>\$143,935.00</u>	<u>\$3,182.45</u>	<u>\$3,182.45</u>	<u>\$143,935.00</u>	<u>\$140,752.55</u>

SUMMARY: Total Expenditures to Date.	<u>\$3,182.45</u>
Projected Expenditures to Date (from Activities Chart).	<u>\$12,574.00</u>
Difference (Projected Expenditures less Actual Expenditures	<u>\$9,391.55</u>



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

September 10, 1975

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman
Contract Manager

Subject: Monthly Progress Report, Contract DOT-FH-11-8782
Open-Graded Asphalt Friction Course Lane Marking System
Report No. 2, for the period 8/1/75-8/31/75

Gentlemen:

Activities for the subject period were as follows:

Phase I - Task A

Letter contacts with manufacturers have been more productive during the subject period. In addition, numerous telephone contacts have been made, with the consequence that samples of quite a few candidate materials have been received, together with technical literature for their evaluation. Included in these materials are samples of synthetic resins, such as ionomers, acrylics, polyamides, etc.

A supply of granite OGAFAC aggregate has been received from Vulcan Materials, and contacts are underway to receive similar quantities of a limestone OGAFAC aggregate.

Other materials needed for the preparation of small quantities of marking paints, such as pigments, dryers, UV absorbers, stabilizers, etc., as well as mixing containers, have been ordered and most of these have been received.

With these materials in hand, formulation studies have commenced. It is anticipated that many of these will have been screened and turned over to the Civil Engineering group for Phase II testing by November, 1975.

Phase I - Task B

Professors Lai and Robnett of Civil Engineering have commenced participation in this project and are assuming responsibility for certain of the tests outlined in Task B. The Industrial Chemistry Laboratory is prepared to proceed with others of these tests, and is awaiting only their formulation in the laboratory.

Department of Transportation
September 10, 1975
Page Two

Phases II and III

Prime responsibility for these phases rests with the Civil Engineering group, who are preparing a schedule of activities for these phases. This schedule will be discussed among project personnel and with the FHA Contract Manager, and will be reported in our next Monthly Report.

Respectfully submitted,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Co-principal Investigator

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ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

October 10, 1975

Department of Transportation
Federal Highway Administration
Washington, D.C. 20590

Attention: Mr. Stewart Spellman
Contract Manager

Subject: Monthly Progress Report, Contract DOT-FH-11-8782
Open-Graded Asphalt Friction Course Lane Marking System
Report No. 3, for the period 9/1/75 through 9/30/75

Gentlemen:

Activities for the subject period were as follows:

Phase I - Task A

Preparation of small quantities of resin held aggregates commenced during September and is well under way. Pigmentation with both yellow and white pigments was included in the program.

Two methods were employed for application of the thermoplastic resins onto the aggregate:

1. A solution of the resin was prepared, using a hydrocarbon solvent. This solution was charged into a ball mill jar, the aggregate and pigments were added, and the jar was rotated for several hours. The mixture was then cast into a form, and the solvent was evaporated under a heat lamp.

2. The aggregate, solid resin and pigments were charged into a small can, and the can was rotated over a controlled flame until a uniform coating was produced on the aggregate. The hot mixture was cast and allowed to cool.

Several samples were prepared using thermoplastic resins such as acryloids, polyamids, ionomers, ABS, etc., with and without the addition of a plasticizer. Thermoset resins, such as epoxy and polyurethanes, are also being investigated.

The samples prepared during this period are being examined, and a preliminary screening of the resin binders will be made. The promising ones will be carried over into subsequent experimentation.

Other lines of investigation include the following:

1. Use of resin combinations in order to obtain a binder with an optimum of desirable properties.

2. Use of resin emulsions as binders.

Phase I - Task B, Subtask 2

As a part of the Phase I - Task B laboratory screening activities, the abrasion and shear resistance of various material systems are to be evaluated. Currently, techniques for placing, testing and evaluating the various material systems are being developed. Small patches of the material will be placed on the surface of a parking lot. These patches will then be subjected to various shear and abrasion actions of vehicle wheels and a snowplow blade. Effects to be evaluated include (a) locked wheel slide, (b) turning of the front wheel of a stationary vehicle, and (c) the abrading action of a snowplow blade.

Also, as a part of the laboratory screening, the vehicle impact resistance of the various material systems is to be evaluated. Dr. E. J. Barenberg at the University of Illinois has been contacted relative to the use of the University of Illinois test tract for this purpose. Details of this arrangement are currently being worked out.

Phase II - Pilot Field Test Sections

Mr. Hugh Tyner of the Georgia Department of Transportation, Highway Division, has been contacted to determine possible locations for field test sections. GHD has indicated a willingness to cooperate in construction of the pilot field test sections.

Respectfully submitted,



W. H. Burrows
Co-Principal Investigator

WHB/rb

A-1753



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

October 17, 1975

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS 22
Contract Manager

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period September 1, 1975 through September 30, 1975.

Sincerely,

A black rectangular box redacting the signature of W. H. Burrows.

W. H. Burrows
Principal Research Scientist

WHB/rjb

Attachment

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

October 15, 1975

Attention: Mr. Stewart Spellman, HRS 22
Contract Manager

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

For the Period September 1, 1975 through September 30, 1975

<u>Category</u>	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* to Date</u>	<u>Previous Free Balance</u>	<u>Free Balance as of 10/1/75</u>
Personal Services:	\$ 70,702.00	\$ 2,648.12	\$ 6,826.15	\$ 66,523.97	\$ 63,875.85
Retirement:	4,897.00	137.31	137.31	4,897.00	4,759.69
Materials & Supplies:	12,000.00	832.31	912.60	11,919.71	11,087.40
Travel:	10,380.00	-	-	10,380.00	10,380.00
Total Direct Charges:	97,979.00	3,617.74	7,876.06	93,720.00	90,102.94
Overhead:	45,956.00	2,004.93	4,618.54	43,342.39	41,337.46
Total Charges and Balances:	\$143,935.00	\$ 5,622.67	\$12,494.60	\$137,063.07	\$131,440.40
SUMMARY: Total Expenditures to Date:.....					\$ 12,494.60
Projected Expenditures to Date (from Activities Chart).....					\$ 37,542.00
Difference (Projected Expenditures less Actual Expenditures).....					\$ 25,047.40

*Including encumbrances



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

November 10, 1975

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22 Mr. Thomas Sullivan HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782
Open-Graded Asphalt Friction Course Lane Marking
System Report No. 4, for the period 10/1/75 through
10/31/75

Gentlemen:

Activities for the subject period were as follows:

Phase I - Task A

A number of one-resin system formulations were prepared during this period and are ready for preliminary evaluation. Among the most promising are those based on Versamid (polyamide, General Mills), Acryloid A-11 (polymethyl methacrylate, Rohm & Haas), Surlyn (Ionomer, DuPont) and Polystyrene 525 (Cosden).

Compatibility studies included various resin combinations and resin-plasticizer combinations. Formulations also included pigments, fillers and other additives. The principal criteria for selection a multi-resin system for further study were toughness and flexibility.

The following systems were selected for further evaluation:

Polystyrene, 75% - Dioctyl phthalate (plasticizer), 25%
Acryloid A-11, 90% - Hercolyn D*, 10%
Versamid 930, 90% - Dioctyl phthalate, 10%
Acryloid B-66, 90% - Dioctyl phthalate, 10%
Polystyrene, 50% - Hercolyn D, 50%
Versamid 930, 75% - Hercolyn D, 25%
Versamid 930, 90% - Hercolyn D, 10%
Versamid 930, 50% - Surlyn AD-8109, 50%
Versamid 930, 50% - Polyurethane XP-2430, 50%
Versamid 930, 40% - Surlyn AD-8109, 60%

*Hercolyn D is a hydrogenated rosin ester (Hercules),

The amount of resin used as a binder of the aggregate in the test pieces ranges from 4 to 10 percent, based upon the weight of the aggregate. The aggregate used in preparing these test pieces is a specification granite OGAFc aggregate having the following size distribution:

<u>Sieve Size</u>	<u>Percent Passing (by weight)</u>
3/8"	100
#4	30-50
#8	5-15
#200	2-5

Work is continuing on formulations of multi-resin systems during the time that those already prepared are being evaluated.

Phase I - Task B through Phase III


1. Progress

The major efforts in this month are in preparation and planning of the works to be conducted in various phases of the project. These include (1) preparation of abrasion resistance and motor vehicle impact tests (Phase I - Task B), (2) installation of pilot field test section (Phase II - Task A), and (3) placement of full scale field test section (Phase III - Task A).

2. Work to be Done in November

- (1) Complete the preparation for abrasion resistance and impact tests.
- (2) Finalize the plans for the installation of field test sections.

Respectfully submitted,


W. H. Burrows
Co-principal Investigator



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

November 14, 1975

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS 22/Mr. Thomas Sullivan HCP-13
Contract Manager Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period October 1, 1975 through October 31, 1975.

Due to bookkeeping delays in dividing the budget between the School of Civil Engineering and the Engineering Experiment Station, no Civil Engineering charges are reflected in this report. The amount of such charges to date is estimated at \$7705.00 total.

Sincerely,

W. H. Burrows
Principal Research Scientist

WHB/dd

Attachment

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Date: November 14, 1975

Attention: Mr. Stewart Spellman, HRS-22/Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period 10/2/75 through 10/31/75

<u>Category</u>	<u>Budget Amount</u>	<u>Expenditures[*] This Period</u>	<u>Expenditures[*] to Date</u>	<u>Previous Free Balance</u>	<u>Free Balance as of 11/1/75</u>
Personal Services:	\$ 70,702.00	\$ 2,279.05	\$ 9,105.20	\$ 63,875.85	\$ 61,596.80
Retirement:	\$ 4,897.00	\$ 181.69	\$ 319.00	\$ 4,759.69	\$ 4,578.00
Materials & Supplies:	\$ 12,000.00	\$ 106.57	\$ 1,019.17	\$ 11,087.40	\$ 10,980.83
Travel:	\$ 10,380.00	\$ -0-	\$ -0-	\$ 10,380.00	\$ 10,380.00
Total Direct Charges:	\$ 97,979.00	\$ 2,567.31	\$10,443.37	\$ 90,102.94	\$ 87,535.63
Overhead:	\$ 45,956.00	\$ 1,549.75	\$ 6,168.29	\$ 41,337.46	\$ 39,787.71
Total Charges and Balances:	\$143,935.00	\$ 4,117.06	\$ 16,611.66	\$131,440.40	\$127,323.34

SUMMARY: Total Expenditures to Date, including C.E. estimate (\$7,705.00) \$ 24,316.66
Projected Expenditures to Date (from Activities Chart). \$ 50,056.00
Difference (Projected Expenditures less Actual Expenditures) \$ 25,739.34

* Including encumbrances



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

December 10, 1975

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782,
Open-Graded Asphalt Friction Course Lane Marking System
Report No. 5, for the period 11/1/75 through 11/30/75.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task A

During the month of November several additional formulations of two-resin systems were prepared. The selection of resin combinations was based on compatibility tests run during the previous period.

The most promising formulations prepared with one- and two-resin systems as binder for the aggregate were evaluated qualitatively for adhesion, toughness, flexibility and porosity. The results are shown in Table 1. Combinations of Versamid 930 (Polyamid) and Surlyn (ionomer) appear to be very promising. At the same time quantitative testing according to specifications has commenced.

In order to test the compliance of the various formulations to certain specifications, larger samples (12" x 12" x 3/4") are being prepared. The month of December will be devoted to the preparation and screening of various formulations on the basis of the various specification tests.

Phase I--Task B through Phase III

A. Progress

1. Equipment Development and Fabrication

The following equipment was developed and/or fabricated during this period:

- a. Repeated, dynamic loading equipment for testing cylindrical specimens of the OGAFc materials. Equipment includes loading device, specimen molds, and recording equipment.

- b. Various molds for making round and square specimens of the OGAFc materials to be tested in parking lot (under tire and simulated snow plow) and for abrasion resistance.
- c. An "outflow" meter for evaluating porosity.
- 2. The Georgia DOT has consented to allow the project to use their aggregate polish machine for partial evaluation of the abrasion resistance of the OGAFc materials.
- 3. Final plans are being made for Phase II pilot field test sections.
- 4. Illinois DOT personnel were visited during the month. The particular objectives and requirements of Phase III test sections were discussed with them. A letter was sent to Mr. Spellman concerning this visit.

B. Work for December

- 1. Initiate testing activities concerning abrasion resistance, impact resistance, strength, and porosity of the various materials.
- 2. Finalize plans for Phase II field test sections.
- 3. Continue planning for Phase III field test sections.

Respectively submitted,



W. H. Burrows
Co-Principal Investigator

WHB/db

TABLE I. PRELIMINARY EVALUATION RESULTS

Formulation Data	Composition	Method of Casting	Adhesion	Toughness	Flexibility	Porosity	Comments
Acryloid A-11	90%	Solvent	Very Good	Good	Poor	Good	
Hercolyn-D	10%						
Total Binder	5%						
Acryloid	80%	Solvent	Very Good	Good	Poor	Good	
DOP	20%						
Total Binder	10%						
Acryloid A-11	40%	Solvent	Very Good	Good	Good(?)	Very Good	
Urethane xp-2430	60%						
Total Binder	5%						
Acryloid B-66	90%	Solvent	Very Good	Good	Poor	Very Good	
DOP	10%						
Total Binder	5%						
Acryloid B-66	50%	Solvent	Good	Good	Poor	Good	
Parlon	50%						
Total Binder	5%						
Acryloid B-66	100%	Hot Melt	Good	Good	Very Good		
Total Binder	10%						
Acryloid B-66	80%	Hot Melt	Good	Good	Very Good		
DOP	20%						
Total Binder	12.5%						

Formulation Data	Composition	Method of Casting	Adhesion	Toughness	Flexibility	Porosity	Comments
Acryloid B-50 Parlon Total Binder	50% 50% 5%	Hot Melt	Good	Good	Poor	Good	
Acryloid B-67 Parlon Total Binder	50% 50% 5%	Hot Melt	Poor	Poor	Poor	Good	
Acryloid A-11 Total Binder	100% 2.5%	Solvent	Good	Good	Poor	Good	
Acryloid A-11 DOP Total Binder	80% 20% 12%	Hot Melt	Good	Good	Poor	Good	Uneven Casting
Acryloid B-44 Versamide DOP Total Binder	54% 37% 9% 11%	Hot Melt	Good	Good	Poor	Good	
Acryloid B-44N Total Binder	100% 10%	Hot Melt	Good	Good	Poor	Good	Uneven Casting
Acryloid B-44N Total Binder	100% 10%	Hot Melt	Good	Good	Poor	Good	Uneven Casting
Acryloid B-48N Parlon Total Binder	50% 50% 10%	Hot Melt	Good	Good	Poor	Good	Uneven Casting

Formulation Data	Composition	Method of Casting	Adhesion	Toughness	Flexibility	Porosity	Comments
Polystyrene Total Binder	100% 5%	Hot Melt	Poor	Good	Poor	Good	
Polystyrene Total Binder	100% 10%	Hot Melt	Good	Good	Poor	Good	
Polystyrene DOP Total Binder	90% 10% 5%	Hot Melt	Poor	Good	Poor	Good	Uneven Casting
Polystyrene DOP Total Binder	80% 20% 5%	Hot Melt	Poor	Good	Poor	Good	Uneven Casting
Polystyrene DOP Total Binder	83% 13% 12%	Hot Melt	Good	Good	Poor	Poor	Uneven Casting
Polystyrene Hercolyn D Total Binder	70% 30% 5%	Hot Melt	Good	Good	Poor	Good	
Polystyrene Total Binder	100% 10%	Solvent	Good	Good	Good	Good	
Versamid Total Binder	100% 5%	Hot Melt	Good	Good	Good	Good	

Formulation Data	Composition	Method of Casting	Adhesion	Toughness	Flexibility	Porosity	Comments
Versamid Total Binder	100% 10%	Hot Melt	Good	Good	Good	Poor	Overheated Melt
Versamid Total Binder	100% 10%	Hot Melt	Good	Good	Good	Good	
Versamid Surlyn Total Binder	50% 50% 5%	Hot Melt	Good	Good	Poor	Good	
Versamid DOP Total Binder	90% 10% 5%	Hot Melt	Good	Good	Good	Good	
Versamid Hercolyn D Total Binder	80% 20% %	Hot Melt	Poor	Good	Good	Good	
Versamid Urethane xp-2430 Total Binder	50% 50% 5%	Hot Melt	Good	Good	Good	Poor	Uneven Casting
Versamid Urethane xp-2430 Total Binder	60% 40% 5%	Solvent	Poor	Poor	Poor	Good	
Versamid Urethane xp-2430 Total Binder	50% 50% 5%	Solvent	Poor	Poor	Good	Poor	Uneven Casting

Formulation Data	Composition	Method of Casting	Adhesion	Toughness	Flexibility	Porosity	Comments
Versamid Acryloid B-44 Total Binder	60% 40% 10%	Hot Melt	Very Good	Good	Good	Good	
Versamid Acryloid B-44 Total Binder	60% 40% 10%	Hot Melt	Very Good	Good	Good	Good	
Versamid Surlyn AD 8109 Total Binder	25% 75% 10%	Hot Melt	Good	Good	Good	Good	
Versamid Surlyn Total Binder	75% 25% 10%	Hot Melt	Good	Good	Good	Good	
Versamid Surlyn 1559 Total Binder	40% 60% 10%	Hot Melt	Good	Good	Good	Good	
Surlyn 1559 Total Binder	100% 10%	Hot Melt	Good	Good	Good	Good	Uneven Casting
Surlyn 1559 Versamid Total Binder	25% 75% 10%	Hot Melt	Good	Good	Good	Good	
Surlyn 1559 Versamid Total Binder	40% 60% 10%	Hot Melt	Good	Good	Good	Good	

Formulation Data	Composition	Method of Casting	Adhesion	Toughness	Flexibility	Porosity	Comments
Surlyn 8109 Total Binder	100% 10%	Hot Melt	Good	Good	Good	Good	
Surlyn 8109 Versamid Total Binder	50% 50% 5%	Hot Melt	Good	Good	Good	Good	
Surlyn Versamid Total Binder	60% 40% 10%	Hot Melt	Good	Good	Good	Good	
Surlyn 8109 Versamid Total Binder	40% 60% 10%	Hot Melt	Good	Good	Good	Good	
Urethane Total Binder	100% 4%	Solvent	Very Good	Good	Good	Good	
Urethane Parlon Total Binder	41% 59% 4%	Solvent	Very Good	Good	Good	Good	
Urethane Total Binder	100% 3%	Solvent	Good	Good	Good	Good	
Urethane Total Binder	100% 4%	Solvent	Good	Good	Good	Good	

Formulation Data	Composition	Method of Casting	Adhesion	Toughness	Flexibility	Porosity	Comments
Urethane Total Binder	100% 12%	Solvent	Good	Good	Good	Good	
Urethane Total Binder	100% 6%	Solvent	Good	Good	Good	Good	
Epoxy Total Binder	100% 3%	Solvent (liquid)	Very Good	Very Good	Poor	Good	
Polyester Total Binder	100% 10%	Liquid	Good	Good	Poor	Good	
Polyester Total Binder	100% 10%	Liquid	Good	Good	Poor	Good	

A-1053



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

December 12, 1975

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period November 1
through November 30, 1975.

Sincerely,

[Redacted signature]

W. H. Burrows
Principal Research Scientist

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period November 1 through November 30, 1975.

<u>Category</u>	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* to Date</u>	<u>Previous Free Balance</u>	<u>Free Balance as of 12/1/75</u>	
Personal Services:	\$70,702.00	\$2,109.81	\$11,215.01	\$61,596.80	\$59,486.99	
Retirement:	4,897.00	143.13	462.13	4,578.00	4,434.87	
Materials & Supplies	12,000.00	90.25	1,109.42	10,980.83	10,890.58	
Travel:	<u>10,380.00</u>	<u>246.15</u>	<u>246.15</u>	<u>10,380.00</u>	<u>10,133.85</u>	
Total Direct Charges:	\$97,979.00	\$2,589.34	\$13,032.71	\$87,535.63	\$84,946.29	
Overhead:	<u>45,956.00</u>	<u>1,424.29</u>	<u>7,592.58</u>	<u>30,787.71</u>	<u>38,363.42</u>	
Total Charges and Balances:	\$143,935.00	\$4,013.63	\$20,625.29	\$127,323.34	\$123,309.71	
SUMMARY:	Total Expenditures to Date, E.E.S. and C.E.....					\$ 20,625.29
	Projected Expenditures to Date (from Activities Chart**)					\$ 28,000.00
	Difference (Projected Expenditures less Actual Expenditures)					\$ 7,374.71

*Including encumbrances

**Revised, November 1975

A-1753



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

January 10, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782,
Open-Graded Asphalt Friction Course Lane Marking System,
Report No. 6, for the period 12/1/75 through 12/31/75.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task A

During the month of December our effort was concentrated on the preparation of samples suitable for carrying-out the required mechanical tests. The resins involved in the production of the samples were Versamid 930 (polyamid) and Surllyn 8109 (an ionomer) in combinations from 80/20 to 20/80. The graded aggregate used was the #89 and the size of samples prepared were 12" x 12" x 3/4". The binder resins were with white or yellow pigments.

Procedure

The aggregate was first heated in an oven for 2 hours to a top temperature in the range of 400°F - 600°F. Then it was removed from the oven and the resins and pigments were added in the above order and mixed as quickly and completely as possible. The mixture was subsequently poured into a mold, glass beads were sprinkled on the surface and a pressure of 20,000 lb/in² was applied.

Sample Formulations

1.	Versamid 930	.361 lb.
	Surllyn 8109	.241 lb.
	White Pigment	.602 lb.
	Aggregate	6.02 lb.

The pigment seemed to be in excess in the above combination and the amount of resin insufficient to wet the pigment and still serve as a binder for the aggregate.

2.	Versamid 930	.361 lb.	
	Surlyn 8109	.241 lb.	
	Aggregate	6.02 lb.	$t^{\circ} = 580^{\circ}\text{F}$
	Pigment (white)	.301 lb.	

The pigment was reduced to 1/2 of the previous formulation. The sample prepared was uniform and the aggregate was well bonded without signs of pigment excess.

3.	Versamid 930	.361 lb.	
	Surlyn 8109	.241 lb.	
	Aggregate	6.02 lb.	$t = 500^{\circ}\text{F}$
	Pigment (white)	.301 lb.	

Sample 3 was identical to sample 2; the only difference was in the temperature of the preheated aggregate.

4. The sample was exactly the same as 3, except that glass beads were added.

Observations

Heating: The temperature at which the aggregate must be heated is a function of the time it takes to remove the aggregate from the oven, mix it with the resin and pigments, and pour and mold the sample.

Mixing: The temperature of the aggregate is the governing factor for good mixing. At higher aggregate temperature the viscosity of the resins is lower, and more uniform mixing is obtained in a shorter time. The higher the temperature, however, the greater the risk for decomposition of the resins. Although the optimum temperature has not been established, it seems to be around 500°F.

Molding Pressure

The premixed sample is coarsely spread into the mold and then the pressure is applied. The sample does not seem to spread and compact any better by the application of 20,000 lb/in² pressure than it does by manual pressure. A roller-type compression seems to be a more effective way to compact the sample in the mold.

Future Work

While the preparation of samples for testing will continue in the month of January, new formulations will also be prepared, with emphasis on polyurethanes, epoxies and polyesters as binders.

Phase I--Task B, through Phase III


A. Progress

1. Numerous specimens were made during the month, utilizing binders including both asphalt and synthetic resins. These specimens are being tested for abrasion resistance, porosity, snow plow resistance, impact resistance, stability, etc.
2. Further progress was made concerning the Phase II pilot field test sections. It appears that an entrance ramp to the Stone Mountain Freeway will be available; its use has been tentatively approved by GDOT, although formal approval has not yet been obtained. Traffic counts taken on this ramp indicated an ADT of about 6,300.
3. Work was continued on developing a complete plan and cost estimate for Phase III field test sections. Emphasis is being placed on determining the extent of proposed Phase III activities that can be accomplished in Illinois.

B. Work for January 1976

1. Continue testing activities concerning abrasion resistance, impact resistance, stability, and porosity of the various materials and mixtures.
2. Submit work plan for Phase II to FHWA.
3. Continue planning for Phase III field test sections.

Respectfully submitted,


W. H. Burrows
Co-Principal Investigator

WHB/db

A 1753



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

January 15, 1976

Department of Transportation
Federal Highway Administration
Washington, D.C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period December 1 through
December 31, 1975.

Sincerely,

A black rectangular box redacting the signature of W. H. Burrows.

W. H. Burrows
Principal Research Scientist

WHB/db

Attachment

January 15, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period December 1 through December 31, 1975

<u>Category</u>	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* to Date</u>	<u>Previous Free Balance</u>	<u>Free Balance as of 12/31/75</u>
Personal Services:	\$70,702.00	\$3,734.42	\$14,949.43	\$59,486.99	\$55,752.57
Retirement:	4,897.00	200.13	662.26	4,434.87	4,234.74
Materials & Supplies:	12,000.00	341.31	1,450.73	10,890.58	10,549.27
Travel:	<u>10,380.00</u>	<u>-</u>	<u>246.15</u>	<u>10,133.85</u>	<u>10,133.85</u>
Total Direct Charges:	\$97,979.00	\$4,275.86	\$17,308.57	\$84,946.29	\$80,670.43
Overhead:	<u>45,956.00</u>	<u>2,373.10</u>	<u>9,965.68</u>	<u>38,363.42</u>	<u>35,990.32</u>
Total Charges and Balances:	\$143,935.00	\$6,648.96	\$27,274.25	\$123,309.71	\$116,660.75

SUMMARY:	Total Expenditures to Date, E.E.S. and C.E.	\$ 27,274
	Projected Expenditures to Date (from Activities Chart).	\$ 33,600
	Difference (Projected Expenditures less Actual Expenditures).	\$ 6,326

*Including encumbrances

A1753



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

February 10, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782,
Open-Graded Asphalt Friction Course Lane Marking System,
Report No. 7, for the period 1/1/76 through 1/31/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task A

During the month of January we continued our effort on the preparation of samples suitable for carrying-out the required mechanical tests. The resins involved in the production of test samples were the following: Jet-Melt Bonding Adhesive (3M), Arcylod A-11 (Rohm & Haas), Acryloid B-66 (Rohm & Haas), Epox-E5, Duro, and Spenkel P49-755. The graded aggregate used was the #89. Samples were prepared in a variety of sizes for various test purposes. The binder resins included white or yellow pigments. Mixing procedures followed previous practices.

Sample Formulations

1. Jet-Melt Bonding Adhesive (3M)

This product is presently used with a heat gun for gluing metal and plastic panels exposed to adverse weather conditions.

- | | |
|----------------------------------------|------|
| a) Hot melt adhesive | 10g |
| Aggregate | 200g |
| b) Hot melt adhesive | 20g |
| Yellow Pigment | 4g |
| Aggregate | 200g |
| c) Same as "b" but white pigment used. | |

Observations

This product is very easy to handle, as it has a relatively low melting point. A possible drawback is the effect on it of various solvents.

2. Acryloid A-11 (Rohm & Haas)

- | | | |
|----|----------------------------------------------------------------|------|
| a) | Acryloid A-11 | 18g |
| | Di-octyl Phthalate | 2g |
| | Yellow pigment | 4g |
| | Aggregate | 200g |
| b) | Same as above but white pigment used. | |
| c) | Same as "a" but Herculyn D used instead of Di-octyl Phthalate. | |

Observations

This Acryloid seems to be the strongest but its high melting point and viscosity make it very difficult to mix with the aggregate.

3. Acryloid B-66 (Rohm & Haas)

This is a lower melting point Acryloid than the A-11. It was successfully compounded with various plastizicers.

- | | | |
|----|--------------------|------|
| a) | B-66 | 16g |
| | Herculyn D | 4g |
| | Yellow pigment | 4g |
| | Aggregate | 200g |
| b) | B-66 | 12g |
| | Herculyn D | 8g |
| | Yellow pigment | 4g |
| | Aggregate | 200g |
| c) | B-66 | 17g |
| | Di-octyl Phthalate | 3g |
| | Yellow pigment | 4g |
| | Aggregate | 200g |
| d) | B-66 | 14g |
| | Herculyn D | 6g |
| | Yellow pigment | 4g |
| | Aggregate | 200g |

- e) Samples using the same combinations on "a", "b", "c" but using white pigment instead of yellow, were also made.

Observations

This Acryloid seems to be the most promising. It is easy to work with, due to its low melting point and viscosity. It also seems strong and flexible.

4. Epoxy* Fast Curing Type

This commercially available Epoxy is said to set in 4-6 minutes.

- | | | |
|----|------------------------------|--------------------------------|
| a) | Epoxy (Resin & Curing Agent) | 10g |
| | Yellow pigment | 4g |
| | Aggregate | 200g |
| b) | Epoxy | 20g |
| | Yellow pigment | 4g |
| | Aggregate | 200g |
| c) | Epoxy | 10g dissolved in Xylene (10cc) |
| | Yellow pigment | 4g |
| | Aggregate | 200g |

Observations

Sample "a" was difficult to mix well, due to the small amount of resin involved. Sample "c" took too long to cure because of slow evaporation of the solvent (Xylene). Sample "b" was very strong and mixed well with the aggregate-pigment. Curing time was about 10 minutes.

5. Polyurethane Resins

- | | | |
|----|-------------------|----------|
| a) | Spengel P49-755** | 5g |
| | Polyol 1955** | 4.5g |
| | Yellow pigment | 4g |
| | Aggregate | 200g |
| | Catalyst | 10 drops |

This sample took over 12 hours to cure.

- b) Same as above but catalyst increased to 25 drops.

The same results were obtained as "a".

*Epoxy-E-5, Duro; Woodhill Chemical Sales Corp., Cleveland, Ohio.

**Spencer-Kellog Division of Textron, Inc.

- c) A sample was made with 10% Polyurethane lacquer. It also took over 12 hours to cure.

Observation

The aggregate-urethane samples were strong and slightly flexible, but the curing time is too long, for practical purposes.

6. High Impact Polystyrene

a)	Polystyrene (Cosden 525)	10g
	Hercolyn D	10g
	Yellow pigment	4g
	Aggregate	200g
b)	Polystyrene	12g
	Hercolyn D	8g
	Yellow pigment	4g
	Aggregate	200g
c)	Polystyrene	14g
	Hercolyn D	6g
	Yellow pigment	4g
	Aggregate	200g

The temperature of mixing was 500° F +5°. Sample "c" was difficult to mix due to the high concentration and high melting point of the polystyrene resin. Sample "a" appeared to offer the best combination.

Phase I - Task B, through Phase III

A. Progress

1. Numerous specimens were made during the month. These specimens are being tested for abrasion resistance, porosity, snowplow resistance, impact resistance, and stability.
2. Modifications were made to the repeated load equipment so that specimens could be tested at 140°F.
3. A testing procedure for determining the retroreflectance of the various specimens was developed.
4. Final details of a testing plan for Phase II were not completed as had been planned. However, this plan will be completed shortly. .

5. Work continued relative to developing a complete test plan and cost estimate for Phase III field test sections. Based upon an Illinois DOT inventory, it appears that insufficient OGAFC is available in Illinois for the planned test sections.
6. Bill Maupin of the Virginia Highway and Transportation Research Council has been contacted concerning the possibility of placing the field sections in Virginia.

B. Work for February 1976

1. Continue testing activities on various candidate materials concerning abrasion resistance, impact resistance, stability, and porosity.
2. Submit work plan for Phase II to FHWA.
3. Continue planning for Phase III field test sections.

Respectfully submitted,



W. H. Burrows
Co-Principal Investigator

WHB:hm



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

September 11, 1975

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman
Contract Manager

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period August 1, 1975,
through August 31, 1975.

Sincerely,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Principal Research Scientist

WHB:bc

Attachment

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

September 11, 1975

Attention: Mr. Stewart Spellman
Contract Manager

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

For the Period August 1, 1975 through August 31, 1975

<u>Category</u>	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* to Date</u>	<u>Previous Free Balance</u>	<u>Free Balance as pf 8/31/75</u>
Personal Services:	\$ 70,702.00	\$ 2,260.55	\$ 4,178.03	\$ 68,784.52	\$ 66,523.97
Retirement:	4,897.00	-	-	4,897.00	4,897.00
Materials & Supplies:	12,000.00	27.39	80.29	11,947.00	11,919.71
Travel:	10,380.00	-	-	10,380.00	10,380.00
Total Direct Charges:	97,979.00	2,287.94	4,258.32	96,008.62	93,720.68
Overhead:	45,956.00	1,401.54	2,613.61	44,743.93	43,342.39
Total Charges and Balances:	\$143,935.00	\$ 3,689.48	\$ 6,871.93	\$140,752.55	\$137,063.07
SUMMARY: Total Expenditures to Date:					\$ 6,871.93
Projected Expenditures to Date (from Activities Chart)					\$ 25,028.00
Difference (Projected Expenditures less Actual Expenditures)					\$ 18,156.07

* Listed expenditures are totals of expenditures plus encumbrances for the designated periods



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

March 9, 1976

Department of Transportation
Federal Highway Administration
Washington, D.C. 20590

Attention: Mr. Stewart Spellman, HRS-22
Contract Manager

Mr. Thomas Sullivan, HCP-13
Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-
Graded Asphalt Friction Course Lane Marking System,
Report No. 8, for the period 2/1/76 through 2/29/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task A

1. Instrumentation for Testing Selected Formulations

The following equipment has been made available to the testing program:

- a) Instron - This instrument is available in the School of Textile Engineering. It is limited to a 250 lb. cell, requiring a modification (scale down) of the samples to be tested. It will be used for bond strength determinations.
- b) Izod-Type - Impact resistance instrument obtained from the School of Ceramic Engineering.
- c) Instrument for Shear Strength Test - Available at School of Ceramic Engineering
- d) Hydraulic-Type Continuous Load Machine - For testing adhesive strength (could replace item "a"), available at School of Civil Engineering.
- e) Photovolt - (Tristimulus) - For daylight reflectance, available at Engineering Experiment Station.

2. Test Samples Using Small Particle Size Aggregate

Samples measuring 6" x 2" x 0.5" (approx.) were cast on aluminum molds using the following formulations:

- a) Ionomer - Versamide - Pigment (40%-60%-2%)
- b) Polystyrene - Herculyn D (50-50%) Pigment (2%)
- c) Pavabrite II Normal (50-50%) Combination of Resin and Plasticizer
- d) Pavabrite II Modified Formulation Using (75%) Flakes and (25%) Plasticizer

All the above formulations were made on the basis of 20g Resin, 4g Pigment, and 200g Aggregate. (10% Resin, 2% Pigment approx.)

The same formulations were made using 6% Resin, 2% Pigment.

3. Test Samples Consisting of Resin and Pigment Only

These samples were made smaller than the (2) above formulations:
6" x 1 $\frac{1}{4}$ " x $\frac{1}{4}$ "

In addition to all the above formulations, several combinations of Ionomer - Plasticizer from Pavabrite II were tried. These did not seem to work, as the plasticizer kept "leaking out" making the surface very "oily".

4. Preliminary Preparation of the Testing Equipment (Calibration and Modification)

Some of the instruments were modified in order to accommodate the test samples prepared above.

5. Tests of Compatibility and Mixing Temperatures

Tests of materials were conducted to determine mixing temperature requirements and to assess the compatibility of plasticizer with resin in each instance. Following are the results:

Acryloid A-11/Herculyn D	Not satisfactory. Required temperature of ca. 620° F to melt, at which temperature the plasticizer is unstable (smokes).
Acryloid B-44/Herculyn D	Same
Acryloid B-44N/Herculyn D	Same
Acryloid B-50/Herculyn D	Same

Acryloid B-67/Hercolyn D

Worked very well at 525°F. It remains fluid at 400°F, 350°F and even at 325°F; however, at 300°F it becomes quite viscous.

Acryloid B-66/Hercolyn D

Same as B-67

Acryloid B-66 was also formulated with the plasticizer from Pavabrite II and demonstrated the same characteristics as B-66 and B-67 with Hercolyn D. However, upon cooling it became opaque and brittle, demonstrating a degree of incompatibility.

6. Initial Pot Life Test (1 Hour Only)

Preliminary pot-life studies showed that samples of Ionomer-Versamide; Ionomer-Versamid-Dioctylphthalate begin to decompose (oxidize) and darken after one hour of constant temperature (500°F) on a hot plate.

7. Solvent Resistance Test

- a) A sample made with Pavabrite II at 10% Resin content was immersed in a kerosene bath. It dissolved completely during the period of one hour.
- b) A sample made with Ionomer-Versamide did not show any change after immersion in kerosene for one hour.
- c) Acryloids B-66, B-67 did not show any change exposed as above.

8. Additional Formulations

Samples containing Ionomer and Pavabrite Plasticizer were mixed with pigment and melted together. These were poured into molds and, after cooling, were cut into sections and added to preheated aggregate at 400°F and mixed.

- 1. Ionomer (50%)
Plasticizer (50%)
Yellow Pigment (4 grams)
Aggregate (200 grams)

The resin-pigment molds were quite flexible and easily cut. The surface was oily due to the silicone grease used as a releasing agent. This problem was solved by wiping very thoroughly the surfaces of the mold in contact with the resin.

- 2. Repeat of Sample 1

The cake obtained showed poor adhesion and was grainy.

- | | | | |
|----|----------------|-----------|-----------------------|
| 3. | Ionomer | 60% | (12 grams) |
| | Plasticizer | 40% | (8 grams) (Versamide) |
| | Yellow Pigment | 5 grams | |
| | Aggregate | 200 grams | |

This sample was a little harder than #1 or 2, and the cakes made were satisfactory. (Temperature 400°F)

Pot Life Test

The materials darken after one hour of continuous heating on the hot plate. (Surface temperature of hot plate 500°F)

Phase I - Task B, Through Phase III

1. Progress

- a) Numerous specimens were made during the month. Binder types from which specimens have been made include:

Asphalt (AC-20)
Versamid-Surlyn
Pavebrite
High Impact Polystyrene-Hercolyn D

These specimens are being tested for abrasion resistance, porosity, snowplow resistance, impact resistance and stability.

- b) During the month, 8 specimens were subjected to the "abrasion test". Also, 10 samples were subjected to as many as 100 passes of the simulated snowplow. Change in retroreflectance was monitored during the progress of these tests.
- c) During the month 10 samples of various thickness were tested at 70°F and 140°F for impact resistance.
- d) Work continued relative to developing final details of the Phase II pilot field test sections. A final test plan was not submitted to FHWA because some details have not been worked out with the Georgia Highway Department.
- e) Work continued relative to developing a complete test plan and cost estimate for Phase III field test sections. Discussion continued with Bill Maupin of the Virginia Highway and Research Council concerning the possibility of placing the field test sections in Virginia.

2. Work for March, 1976

- a) Continue Phase I testing activities on various candidate materials.
It is envisioned that by the end of month most of testing concerning abrasion resistance, impact resistance, stability, etc. will be completed.
- b) Submit work and test plan for Phase II FHWA.
- c) Continue planning activities for Phase III, field test sections.

Respectfully submitted,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Co-Principal Investigator

WHB:hg



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

March 25, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590


Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period February 1, 1976
through February 29, 1976.

Sincerely,


W. H. Burrows
Principal Research Scientist

WHB/mh

Attachment

March 25, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period February 1, 1976 through February 29, 1976

<u>Category</u>	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 2/29/76</u>
Personal Services:	\$ 70,702.00	\$ 4,309.00	\$ 23,790.51	\$ 51,220.49	\$ 46,911.49
Retirement:	4,897.00	193.69	1,120.71	3,969.98	3,776.29
Materials and Supplies:	12,000.00	212.93	1,795.04	10,417.89	10,204.96
Travel:	10,380.00	216.14	462.29	10,133.85	9,917.71
Total Direct Charges:	97,979.00	4,931.76	27,168.55	75,742.21	70,810.45
Overhead:	45,956.00	2,930.12	16,154.30	32,731.82	29,801.70
Total Charges and Balances:	143,935.00	7,861.88	43,322.85	108,474.03	100,612.15

SUMMARY: Total Expenditures to Date, E.E.S. and C.E. \$ 43,323
Projected Expenditures to Date (from Activities Chart). 44,800
Difference (Projected Expenditures less Actual Expenditures). 1,477

*Including encumbrances

A-1753



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

April 9, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22
Contract Manager

Mr. Thomas Sullivan, HCP-13
Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded Asphalt Friction Course Lane Marking System, Report No. 9, for the period 3/1/76 through 3/31/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task A

1. Formulation Studies, Polyurethanes

During the subject period the initial effort was given to thermosetting polyurethanes as binders for OGAF materials. Two-component urethane systems, "Cyanaprene" urethane prepolymer and "Cyanaset" curative were tested. These are products of American Cyanamid Co., as indicated by the trade names.

Several formulations were made, using "Cyanaprenes" of different -NCO content, with varying amounts of curative "Cyanaset-M" and of catalyst. The catalysts employed were adipic acid and citric acid, which shorten the curing time of the binder.

The formulation procedure consisted of heating the urethane prepolymer to ca 200°F and mixing with the curative, premelted at ca 230°F. The acid catalyst and the pigments were then added, and the whole mixture was added to the aggregate, preheated to ca 200°F.

The set-time was found to be a function of both the prepolymer-to-curative ratio and the amount of acid catalyst added. In addition, the set-time was different for formulations containing aggregate and those without aggregate, because of the difference in heat transfer.

In small batches, the set-time can be controlled from a few minutes to several hours. Difficulties are expected to arise, however, upon scale-up of the operation, and more work will be required in order to optimize the compounding procedure.

The following formulations were prepared and tested:

1.	Cyanaprene CA-8	10.0g
	Cyanaset-m	10.6g
	Citric Acid	0.1g
2.	Cyanaprene CD-5	10.0g
	Cyanaset-m	1.74g
	Citric Acid	0.01g
3.	Cyanaprene CD-5	10.0g
	Cyanaset-m	1.74g
4.	Cyanaprene CD-5	10.0g
	Cyanaset-m	2.0g
	Citric Acid	0.01g
5.	Cyanaprene CD-5	15.0g
	Cyanaset-m	3.0g
	Aggregate	200.00g
	Chrome Yellow	2.0g
6.	Cyanaprene CA-8	10.0g
	Cyanaset-m	1.25g
	Citric Acid	0.01g
7.	Aggregate	200.0g
	Cyanaprene CD-5	10.0g
	Cyanaset-m	1.06g
	Adipic Acid	0.01g
	Chrome Yellow	2.0g
8.	Aggregate	200.0g
	Cyanaprene CD-5	10.0g
	Cyanaset-m	1.06g
	Adipic Acid	0.01g
	White Pigment	2.0g
9.	Aggregate	200.0g
	Cyanaprene CD-5	10.0g
	Cyanaset-m	1.74g
	Adipic Acid	0.01g
	Chrome Yellow	2.0g
10.	Aggregate	200.0g
	Cyanaprene CD-5	10.0g
	Cyanaset-m	1.74g
	Adipic Acid	0.01g
	White Pigment	2.0g

11.	Aggregate	200.0g
	Cyanaprene CD-5	10.0g
	Cyanaset-m	2.0g
	Adipic Acid	0.01g
	Chrome Yellow	2.0g
12.	Aggregate	200.0g
	Cyanaprene CD-5	10.0g
	Cyanaset-m	2.0g
	Adipic Acid	0.01g
	White Pigment	2.0g
13.	Aggregate	200.0g
	Cyanaprene CA-8	10.0g
	Cyanaset-m	2.0g
	Adipic Acid	0.01g
	White Pigment	2.0g
14.	Aggregate	200.0g
	Cyanaprene CD-5	10.0g
	Cyanaset-m	3.0g
	Adipic Acid	0.01g
	Chrome Yellow	2.0g

Formulations 1-4 were made in order to find a faster curing. Citric acid was used as the accelerating agent in these samples.

In formulations 7-14, Adipic acid was used to improve curing time. (This is the manufacturer's recommended acid for this purpose.)

The overall results are not completely satisfactory. Curing time was improved and reduced to about 1/2-1 hour, but in formulations including pigments and aggregate, these curing times were not reproduced consistently. Some samples cured while mixing; others took much longer than the expected 1 hour.

Further studies are recommended on this resin.

2. Formulation Studies, Acrylics

The following acrylic formulations were studied:

1.	Acryloid B-66	10g
	Hercolyn D	10g
	Yellow Pigment	2g
	Aggregate	200g
2.	Acryloid B-66	10g
	Hercolyn D	10g
	White Pigment	2g
	Aggregate	200g

These two showed satisfactory adhesion and flexibility, although there appears to be an excess of resin.

3. Same as 1 and 2 but with only 6% total resin used.

Acryloid B-66	6g
Hercolyn D	6g
Pigment	2g
Aggregate	200g

The following formulations use different ratios of Acryloid-Hercolyn D

4. Acryloid	12g
Hercolyn D	8g
Yellow Pigment	2g
Aggregate	200g

5. Acryloid	8g
Hercolyn D	12g
Yellow Pigment	2g
Aggregate	200g

Formulas 3 and 4 were improvements over 1 and 2; however, 5 has too much plastizicer and is very "tacky" to the touch.

Several combinations of Acryloid B-66 and Di-Octyl PHalate. Also with Hercolyn D.

6. Acryloid B-66	17g
Di-O-P	3g
Yellow Pigments	2g
Aggregate	200g

Satisfactory.

7. Acryloid B-66	15g
D-O-P	5g
Yellow Pigment	2g
Aggregate	200g

This one is "Tacky" to the touch.

8. Acryloid B-66	10g
Hercolyn D	8g
D-O-P	2g
Yellow Pigment	2g
Aggregate	200g

Satisfactory.

Testing of Samples containing Resin and Pigment.

These are samples made by casting a mixture of resin and pigment into a mold measuring 6" x 1-1/4" x 1/4".

So far all the test specimens have been too flexible for effective breakage on the IZOD-TYPE impact resistance instrument.

Phase I - Task B, Through Phase III

A. Progress

1. Numerous specimens were made during the month. In particular, specimens were made from Acryloid B-66 for Marshall stability, abrasion resistance, snowplow resistance, and impact resistance testing. Additionally, specimens were made to evaluate the effect of a plasticizer additive on the stability and flow of the Versamid-ionomer binder.
2. Preliminary evaluation of a thermo-set binder, a polyurethane, was conducted. Some problems were encountered relative to controlling set until the large specimens could be made.
3. About 80 percent of the solvent resistance testing of the binder materials was completed during the month.
4. The resistance of the various binder-aggregate mixtures to the scuffing action of turning car tires was evaluated.
5. Equipment to be used for making "prefabricated" pieces of the delineation systems was fabricated.
6. Final details of the Phase II field study were completed. A detailed test plan was submitted to FHWA.
7. Work continued relative to developing a work plan for Phase III field test sections. A letter was received from Bill Maupin of the Virginia Highway and Transportation Research Council indicating their willingness to cooperate. However, personnel shortages were such that they could only provide traffic control. Thus, installation apparently will have to be done by Georgia Tech.

B. Work for April, 1976

1. Complete the few remaining testing activities on the following thermoplastic binder materials:

versamid-ionomer
pavebrite
acryloid B-66
high impact polystyrene

2. Complete preliminary evaluation of the potential of two thermoset binders:
 - a. polyurethane
 - b. polyester + polystyrene
3. Prefabricate strips of each of the promising delineation systems for placement in the Phase II field test section.
4. Finalize the test plan for Phase II test sections.
5. Continue planning activities for Phase III test sections.

Respectfully submitted,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Co-Principal Investigator

WHB/bw

A-1753



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

April 14, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period March 1, 1976
through March 31, 1976.

Sincerely,

[Redacted signature]

W. H. Burrows
Principal Research Scientist

WHB/mh

Attachment

April 14, 1976

Dept. of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the period March 1, 1976 through March 31, 1976

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance as of 3/31/76</u>
Personal Services:	\$70,702.00	\$ 2,960.78	\$ 26,751.29	\$ 46,911.49	\$ 43,950.71
Retirement:	4,897.00	236.16	1,356.87	3,776.29	3,540.13
Materials and Supplies:	12,000.00	113.73	1,840.77	10,204.96	10,159.23
Travel:	10,380.00	30.60	492.89	9,917.71	9,887.11
Total Direct Charges:	97,979.00	3,341.27	30,441.82	70,810.45	67,537.18
Overhead:	<u>45,956.00</u>	<u>2,013.33</u>	<u>18,167.63</u>	<u>29,801.70</u>	<u>27,788.37</u>
Total Charges and Balances:	143,935.00	5,354.60	48,609.45	100,612.15	95,325.55

SUMMARY: Total Expenditures to Date, E.E.S. and C.E. \$ 48,609
Projected Expenditures to Date (from Activities Chart) 50,400
Difference (Projected Expenditures less Actual Expenditures) 1,791

*Including encumbrances

A-1753



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

May 10, 1976

Department of Transportation
Federal Highway Administration
Washington, D.C. 20590

Attention: Mr. Stewart Spellman, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded Asphalt Friction Course Lane Marking System, Report No. 10, for the period 4/1/76 through 4/30/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task A

1. Sample Formulations Using Hot Melt Glues

Hot Melt Glue from AMSCO DIVISION, UNION OIL COMPANY of California

This product is currently used to bond glass, metal, plastic materials.

- | | |
|--------------------------------------------------------------------|---------|
| a) Hot Melt Glue | 10 gr. |
| Yellow | 4 gr. |
| Aggregate | 200 gr. |
| b) Hot Melt Glue | 20 gr. |
| Yellow | 4 gr. |
| Aggregate | 200 gr. |
| c), d) Same as a, b, but white pigment was used instead of yellow. | |

Observations

The samples obtained were satisfactory. The resin melted at a relatively low temperature (350°F - 450°F). At 5% resin, it was a little difficult to "wet" all the aggregate and the pigment. The 10% resin offered no difficulties at all. The "cake" formed is hard but not brittle and its hardness suggested a modification with plasticizers.

e) Hot Melt Glue	18 gr.
Hercolyn D	2 gr.
Yellow	4 gr.
Aggregate	200 gr.
f) Hot Melt Glue	16 gr.
Hercolyn D	4 gr.
Yellow	4 gr.
Aggregate	200 gr.

g), h) These were the same as e and f, but white pigment was used instead of yellow.

Observations

From these plasticized samples the 18 gr. resin and 2 gr. Hercolyn D combinations were the best. They had enough adhesion, flexibility, and hardness. The others were too flexible and showed less adhesive power.

2. Test Procedures

Pot Life Test on the AMSCO Hot Melt Glue

Samples of the product were kept in an oven for 12, 24, 48, 60 hours without any observable deterioration (oxidation).

Solvent Resistance

Samples were immersed in Mineral Spirits for one hour. No weight loss was recorded.

Test Samples Using Resin Only

The Hot Melt Glue was melted and cast into molds measuring 6" x 2" x 0.5" (approximately).

Test Samples using Resin and Pigment were made as above.

3. Further Studies on Polyurethane Resins (Thermo-set)

Several combinations of polyurethane resins were prepared using

Cyanaprene CA-8 (%NCO 3.4)
Cyanaprene D-5 (%NCO 5.0)

with urethane curative

Cyanaset

These formulations gave composites that were very strong and somewhat flexible but curing times varied from 5 minutes to 12 hours, and repeatability was not obtained.

The samples were made using the standard mix of:

Cyanaprene CA-8 (or D-5)	8.6 gr.
Cyanaset (curative)	1.7 gr.

Small variations on the amount of curative accounted for the wide variations in the curing time. It is possible that the moisture in the pigment and (or) aggregate might have influenced the curing time.

Phase I - Task B, Through Phase III

A. Progress

1. The major activity during the month was laboratory production of prefabricated pieces of the various delineation system materials for placement in the Phase II field test sections. Each of the pieces is 4-1/8" x 15" x 5/8". A total of 130 of these must be made. About 70 were made during the month. A maximum production rate of 4 per hour was attained. Installation of a Teflon lining in the bottom of the molds facilitated the production rate somewhat.
2. A new material, hot melt glue, was started through the suite of Phase I tests. This material appears very promising, and testing is being completed as quickly as possible in order that the material can be properly evaluated prior to installation in the test sections.
3. A final test plan for Phase II field test sections was submitted to FHWA.
4. Work continued relative to developing a work plan for Phase III field test sections. Contact with Bill Maupin of the Virginia Highway and Transportation Research Council confirmed that the installation of the test sections cannot be done by Virginia personnel. Since Georgia Tech will be responsible for installation, it has been decided that all materials must be prefabricated in the laboratory.

B. Work for May, 1976

1. Major emphasis will be on construction of the Phase II Field Test Sections.

May 10, 1976
Page 4

2. Numerous screening tests will be completed, especially tests on the hot melt glue.
3. Production of the prefabricated strips of the delineation materials will be completed.
4. Planning activities for Phase III test sections will continue.

Respectully submitted,



W. H. Burrows
Co-Principal Investigator

ljb

A-1753



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

May 21, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period April 1, 1976
through April 30, 1976.

Sincerely,

A black rectangular box redacting the signature of W. H. Burrows.

W. H. Burrows
Principal Research Scientist

WHB/mh
Attachment

May 21, 1976

Dept. of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial REport, Contract DOT-FH-11-8782
For the period April 1, 1976 through April 30, 1976

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance as of 4/30/76</u>
Personal Services:	\$ 70,702.00	\$ 2,522.67	\$ 29,273.96	\$ 43,950.71	\$ 41,428.04
Retirement:	4,897.00	204.42	1,561.29	3,540.13	3,335.71
Materials and Supplies:	12,000.00	155.15	1,995.92	10,159.23	10,004.08
Travel:	10,380.00	-	492.89	9,887.11	9,887.11
Total Direct Charges:	97,979.00	2,882.24	33,324.06	67,537.18	64,654.94
Overhead:	45,956.00	1,715.41	19,883.04	27,788.37	26,072.96
Total Charges and Balances:	\$ 143,935.00	\$ 4,597.65	\$ 53,207.10	\$ 95,325.55	\$ 90,727.90

SUMMARY: Total Expenditures to Date, E.E.S. and C.E.	\$ 53,207
Projected Expenditures to Date (from Activities Chart)	55,900
Difference (Projected Expenditures less Actual Expenditures)	2,693

*Including encumbrances

#1753-

ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

June 10, 1976

Department of Transportation
Federal Highway Administration
Washington, D.C. 20590

Attention: Mr. Stewart Spellman, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-
Graded Asphalt Friction Course Lane Marking System,
Report No. 11, for the period 5/1/76 through 5/31/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task A

Formulation studies during this period were directed toward improving the flexibility, adhesion and elasticity of the commercial hot melt glues which have proven to be most satisfactory as a binder in OGAFRC lane marking material. The formulation developed has been utilized in preparing some of the striping material used in Phase I--Task B.

Preparation of suitable test pieces of this material for the battery of physical tests which must be performed has presented many problems. A specially prepared silicone rubber mold has been cast from RTV compound and appears to present the best solution thus far to this problem. Attempts to prepare strips by injection molding into a commercially prepared mold failed because of incomplete controls of temperature and pressure on the injection molding machine. Use of the silicone mold has a further advantage in that this type of molding process more nearly resembles that of the preparation of the lane striping materials.

Phase I--Task B, Through Phase III

A. Progress

1. The major laboratory activity during the month was production of prefabricated pieces of the four delineation system materials to be placed in the Phase II field test sections. A total of 176 of the 15 inch long by 4-1/8 inch wide by 5/8 inch thick pieces have been made.

2. Phase I laboratory screening tests relative to abrasion, impact, and solvent resistance have been essentially completed, as have retroreflectance, porosity and texture depth measurements.
3. Installation of the Phase II field test section had been planned for May 27. However, unforeseen mechanical problems with the groover and rain caused postponement until early June. (Rain on June 2 also caused a postponement).
4. Work continued relative to finalizing details for the Phase III field test sections.

B. Work for June, 1976

1. Phase II field section will be constructed.
2. A visit will be made to Virginia to meet with Bill Maupin and the contractor who won the bid for an OGAFc overlay job on I-81. The purpose of the meeting is to discuss the details of placing a delineation system during the OGAFc overlay.
3. Large scale production of the prefabricated strips of delineation materials will be initiated.
4. Phase I screening test data will be reduced and summarized.
5. Planning activities for Phase III test sections will continue.

Interim Report

An interim report covering the activities of the period July 1975 through June 1976 is at present in preparation.

Respectfully submitted,



W. H. Burrows
Co-Principal Investigator

June 21, 1976

Dept. of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period May 1, 1976 through May 31, 1976

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 5/31/76</u>
Personal Services:	\$ 70,702.00	\$ 2,391.46	\$ 31,665.42	\$ 41,428.04	\$ 39,036.58
Retirement:	4,897.00	99.83	1,661.12	3,335.71	3,235.88
Materials and Supplies:	12,000.00	34.23	2,030.15	10,004.08	9,969.85
Travel	10,380.00	-	492.89	9,887.11	9,887.11
Total Direct Charges:	97,979.00	2,525.52	35,849.58	64,654.94	62,129.42
Overhead:	45,956.00	1,626.19	21,509.23	26,072.96	24,446.77
Total Charges and Balances:	\$ 143,935.00	\$ 4,151.71	57,358.81	90,727.90	86,576.19

SUMMARY: Total Expenditures to Date, E.E.S. and C.E. \$ 57,359
 Projected Expenditures to Date (from Activities Chart) 61,400
 Difference (Projected Expenditures Less Actual Expenditures) 4,041

*Including encumbrances

A-1753

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

July 13, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-
Graded Asphalt Friction Course Lane Marking System,
Report No. 12, for the period 6/1/76 through 6/30/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task A

No further formulation work has been conducted during this report period. Personnel assigned to this study have been reassigned to provide assistance to the Task B efforts.

Phase I--Task B, Through Phase III

A. Progress

1. The primary installation for the Phase II, Pilot Field Test Sections, was placed on June 8, 1976 at the previously designated location. The supplemental test section (for snowplow resistance evaluation) has not been placed due to minor mechanical breakdown of the grooving equipment. It is anticipated that the supplemental test section will be placed in July.
2. The major laboratory activity during the month has been in production of white Hot Melt Glue porous delineation material to be placed in Virginia as part of the Phase III activities. Presently, two full-time and one half-time students are working in the laboratory. The production rate is about 60-70 ft. of delineation stripe per day. As of the end of June about 400 ft. of stripe has been produced (a total of about 1000 ft. of stripe is required per test section).

3. A meeting was held on June 7, 1976, in Winchester, Virginia to discuss some of the details of the Phase III, Field Test Section construction. Attending the meeting were Stewart Spelman and Ed Harrigan of FHWA, Bill Maupin and Bucky Blackburn of the Virginia Highway and Trans. Res. Council and the Virginia Department of Highways and Transportation, Dr. Quentin Robnett, Georgia Tech, and personnel from Stuart M. Perry, Inc. the contractor for the OGAFc overlay. Two potential sites for the test sections were examined. It was decided, based primarily on traffic control considerations, that the test sections would be placed on U. S. Route 50, a divided 4-lane highway west of Winchester, Va. It was also decided that the proposed construction procedure for installation of the delineation stripe simultaneously with the OGAFc overlay would be tried over a very short section during an overlay job on I-81 near Winchester, Va.
4. Wet sieve analyses were conducted on a sample of the OGAFc mix aggregate obtained at the Stuart M. Perry, Inc. plant. Also, a wet sieve analysis was conducted on the aggregate being used to produce the delineation system stripes for the Virginia test site and the Georgia test site. The results are summarized below.

% Passing

<u>Screen</u>	<u>Va. Job Mix.</u>	<u>Perry Plant Sample</u>	<u>Georgia Agg. for Va.</u>	<u>Agg. for Georgia Site</u>
1/2	100	100	100	100
3/8	90.2	96.8	86.2	97
4	17.5	37.1	24.5	25
8	3.8	4.3	1.5	3.5
#10	-	-	0.9	-
#16	-	-	0.5	1.5
30	1.5	2.3	-	-
50	1.2	1.7	0.5	1.0
200	0.7	1.0	0.2	0.0

B. Work for July, 1976

1. Phase II primary field test section will be monitored.
2. Phase II supplementary test section will be installed.
3. Production of the prefabricated strips of the delineation materials will continue.

4. The construction technique for installing the prefabricated strips of the delineation material simultaneously with an OGAFc overlay will be tried and evaluated (see item 3 above).
5. Other planning activities for Phase III will continue.

Interim Report

An interim report covering the activities of the period July 1975 through June 1976 is at present in preparation.

Respectfully submitted,

[REDACTED]

W. H. Burrows
Co-Principal Investigator

rah

A-1753



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

July 27, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period June 1, 1976
through June 30, 1976.

Sincerely,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Principal Research Scientist

WWB/mh
Attachment

July 27, 1976

Dept. of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period June 1, 1976 through June 30, 1976

	<u>Budget Amount</u>	<u>Expenditures*~ This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 6/30/</u>
Personal Services:	\$ 70,702.00	\$ 3,473.81	\$ 35,139.23	\$ 39,036.58	\$ 35,562.77
Retirement:	4,897.00	173.70	1,834.82	3,235.88	3,062.18
Materials and Supplies:	12,000.00	119.59	2,149.74	9,969.85	9,850.26
Travel:	10,380.00	136.90	629.79	9,887.11	9,750.21
Total Direct Charges:	97,979.00	3,904.00	39,753.58	62,129.42	58,225.42
Overhead:	45,956.00	2,362.18	23,871.41	24,446.77	22,084.59
Total Charges and Balances:	143,935.00	6,266.18	63,624.99	86,576.19	80,310.01

SUMMARY: Total Expenditures to Date, E.E.S. and C.E. \$ 63,625
 Projected Expenditures to Date (from Activities Chart) 66,900
 Difference (Projected Expenditures Less Actual Expenditures) 3,275

* Including encumbrances



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

August 10, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22
Contract Manager

Mr. Thomas Sullivan, HCP-13
Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-
Graded Asphalt Friction Course Lane Marking System,
Report No. 13, for the period 7/1/76 through 7/31/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task B, Through Phase III

A. Progress

1. A series of telephotometric readings and photographs was taken of the Phase II Pilot Field Test Sections on July 12, 1976. The supplemental test section (for snowplow resistance evaluation) has not been placed but placement is now anticipated in mid-August.
2. The major laboratory activity during the month has been in production of white pigmented Hot Melt Glue delineation materials for placement in Virginia as part of Phase III activities. As of the end of July, 1976, a total of 1400 15 inch long samples have been produced (about 4000 are required).
3. A meeting was held with FHWA in which results of Phase II to date were discussed.
4. A visit was made to Winchester, Va. by Stewart Spellman and Dr. Quentin Robnett to try the proposed delineation system installation procedure during an OGAFS overlay job on I-81. Results indicated that AC-20 asphalt cement could be used as the adhesive to hold the prefabricated sections in place during the overlay.
5. Negotiations are being made with Ray Tooke to handle the retroreflectance monitoring of the field test sections.

6. Negotiations are also being made with Transportation Safety Systems, Inc., Columbus, Ohio, to handle the pavement grooving for the Virginia test sections.
7. A tentative test plan for Phase III was submitted to FHWA.

B. Work for August, 1976

1. The Phase II supplemental test sections are scheduled for construction and monitoring.
2. The Phase III test sections consisting of the white hot melt glue delineator system simultaneously placed with an OGAFG overlay will be constructed. Additionally, the alkyd base beaded paint control sections will be placed.
3. An additional monitoring of the above sections will be made.
4. Details of the grooving operation will be finalized and a grooving subcontractor selected.
5. Production of the prefabricated delineation system samples will continue.

Interim Report

An interim report covering the activities of the period July 1975 through June 1976 is at present in preparation.

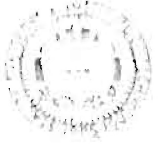
Respectfully submitted,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Co-Principal Investigator

ayw

A-1753



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

August 24, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period July 1, 1976
through July 31, 1976.

Sincerely,

W. H. Burrows
Principal Research Scientist

WHB/mh
Attachment

Dept. of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period July 1, 1976 through July 31, 1976

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 7/31/76</u>
Personal Services:	\$ 70,702.00	\$ 4,628.34	\$ 39,767.57	\$ 35,562.77	\$ 30,934.43
Retirement:	4,897.00	151.75	1,986.57	3,062.18	2,910.43
Materials and Supplies:	12,000.00	1,005.26	3,155.00	9,850.26	8,845.00
Travel:	10,380.00	370.00	999.79	9,750.21	9,380.21
Total Direct Charges:	97,979.00	6,155.35	45,908.93	58,225.42	52,070.07
Overhead:	45,956.00	3,147.27	27,018.68	22,084.59	18,937.32
Total Charges and Balances:	143,935.00	9,302.62	72,927.61	80,310.01	71,007.39

SUMMARY: Total Expenditures to Date, E.E.S. and C.E. \$ 72,928
Projected Expenditures to Date (from Activities Chart) 72,400
Difference (Projected Expenditures Less Actual Expenditures) 528

*Including encumbrances



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

September 10, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22
Contract Manager

Mr. Thomas Sullivan, HCP-13
Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded Asphalt Friction Course Lane Marking System, Report No. 14, for the period 8/1/76 through 8/31/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task B, Through Phase III

A. Progress

1. The "simultaneously constructed" test section was constructed on U.S. 50 west of Winchester, Virginia during the subject period.
2. This test section and control sections of paint on OGAFRC and paint on dense mix asphalt were monitored during the subject period. A series of telephotometer readings and photographs were taken as part of the monitoring operation.
3. Approval was obtained to use Mr. Ray Tooke as a consultant on the telephotometer monitoring of the test sections.
4. A bid price for grooving of the other four 2500 foot test sections on U.S. 50 has been solicited from Transportation Safety Systems, Inc. of Columbus, Ohio. As soon as a confirmed bid price is received, a request for approval of such will be submitted.
5. Sufficient Pavabrite II binder material has been located in Burlington, Vermont. Delivery is expected early in September.
6. The major laboratory activity during the subject period was continued production of the 15 inch long samples of the special delineation system.
7. The supplemental test section of Phase II (for snowplow evaluation) was placed in an access road at the GHD Materials Laboratory in Forest Park, Georgia.

September 10, 1976

Page 2

B. Work for September, 1976

1. Monitor Phase II primary and supplemental test sections.
2. Continue production of prefabricated delineation system samples.
3. Examine data gathered at the first monitoring of the Phase III test sections.

Respectfully submitted,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Co-Principal Investigator

WB/kh

A-1753

ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

September 28, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period August 1, 1976
through August 31, 1976.

Sincerely,

W. H. Burrows
Principal Research Scientist

WHB/mh
Attachment

Dept. of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period August 1, 1976 through August 31, 1976

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 8/31/76</u>
Personal Services:	\$ 70,702.00	\$ 4,826.81	\$ 44,594.38	\$ 30,934.43	\$ 26,107.62
Retirement:	4,897.00	153.20	2,139.77	2,910.43	2,757.23
Materials and Supplies:	12,000.00	1,083.16	4,238.16	8,845.00	7,761.84
Travel:	10,380.00	1,162.34	2,162.13	9,380.21	8,217.87
Total Direct Charges:	97,979.00	7,225.51	53,134.44	52,070.07	44,844.56
Overhead:	45,956.00	3,282.23	30,300.91	18,937.32	15,655.09
Total Charges and Balances:	143,935.00	10,507.74	83,435.35	71,007.39	60,499.65

SUMMARY: Total Expenditures to Date, E.E.S. and C.E. \$ 83,435.35
Projected Expenditures to Date (from Activities Chart) 83,400.00
Difference (Projected Expenditures Less Actual Expenditures) -35.35



A-1753

ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

October 10, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded Asphalt Friction Course Lane Marking System, Report No. 15, for the period 9/1/76 through 9/30/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task B, Through Phase III

A. Progress

1. A "quote" was obtained from Transportation Safety Systems, Inc. to do the grooving on U.S. Route 50 west of Winchester, Va. The quote was on the order of \$15,000 for 3720 lineal ft. of grooving. This price was about double that anticipated.
2. A request for approval of the above subcontract to T.S.S. has been submitted to Tom Sullivan, FHWA.
3. Pavabrite II binder materials were obtained from Pike Company, Burlington, Va.
4. The major Civil Engineering laboratory activity during subject period was continued production of the special delineator system materials. Unfortunately some delay in the production operation occurred while waiting on delivery of the Pavabrite II materials.
5. Engineering Experiment Station activities are directed toward completion of the testing program required to screen tests which might be employed for quality control. Current test program includes the following:

- Freeze-thaw resistance
- Daylight reflectance
- Color and color retention
- Resistance to light
- Coefficient of linear thermal expansion
- Flow rate
- Pot life

October 10, 1976

Page 2

6. Unfortunately, Phase II field test sections were not monitored during subject period due to the unavailability of the telephotometer and recording equipment. Mr. Ray Tooke was using this equipment in reduction of the data taken at the first monitoring of the Phase III field test section.

B. Work for October, 1976

1. Monitor Phase II test sections.
2. Continue production of special delineators.
3. Finalize arrangements for installation of the remaining tests sections of the Phase III field study.
4. Complete draft of Interim Report.

Respectfully submitted,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Co-Principal Investigator

WB/cp

A-1753



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

October 29, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period September 1,
1976 through September 30, 1976.

Sincerely,

W. H. Burrows
Principal Research Scientist

/da

Attachment

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

A-1753

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period September 1, 1976 through September 30, 1976

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 9/30/76</u>
Personal Services:	\$ 70,702.00	\$ 2,465.91	\$ 47,060.29	\$ 26,107.62	\$ 23,641.71
Retirement:	4,897.00	80.65	2,220.42	2,757.23	2,676.58
Materials and Supplies:	12,000.00	17.07	4,255.23	7,761.34	7,744.77
Travel:	10,380.00	209.26	2,371.39	8,217.87	8,008.61
Total Direct Charges:	97,979.00	2,772.89	55,907.33	44,844.56	42,071.67
Overhead:	45,956.00	1,676.82	31,977.73	15,655.09	13,978.27
Total Charges and Balances:	143,935.00	4,449.71	87,885.06	60,499.65	56,049.94

SUMMARY: Total Expenditures to Date, E.E.S. and C.E. \$ 87,885.06

Projected Expenditures to Date (from Activities Chart) 88,900.00

Difference (Projected Expenditures Less Actual Expenditures) (1,014.94)

A-1753

ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

November 10, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Brian Chollar, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded
Asphalt Friction Course Lane Marking System, Report No. 16,
for the period 10/1/76 through 10/31/76.

Gentlemen:

Activities for the subject period were as follows:

Phase I--Task B, Through Phase III

A. Progress

1. Final details of the test section installation in Virginia have been completed. Installation is scheduled to start on November 8, 1976.
2. A subcontract has been made to Transportation Safety Systems for the pavement grooving.
3. The major laboratory work conducted by Civil Engineering during the period was continued production of the special delineator system materials.
4. Stewart Spellman, FHWA Contract Technical Manager, visited with Georgia Tech contract staff during the week of October 5-9, 1976.

B. Work for November, 1976

1. Install delineators in four test sections on U.S. 50 west of Winchester, Virginia.
2. Monitor the test sections in Virginia with the telephotometer.
3. Complete monitoring of Georgia test sections.

Respectfully submitted,



W. H. Burrows
Co-Principal Investigator

A-1783

ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

November 29, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Dr. Brian Chollar, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period October 1 through October 31, 1976.

Sincerely,



W. H. Burrows
Principal Research Scientist

WHB/mh
Attachment

November 29, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Dr. Brian Chollar, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period October 1, 1976 through October 31, 1976

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 10/31/76</u>
Personal Services:	\$ 70,702.00	\$ 2,752.45	\$ 49,812.74	\$ 23,641.71	\$ 20,889.26
Retirement:	4,897.00	80.48	2,300.90	2,676.58	2,596.10
Materials and Supplies:	12,000.00	160.67	4,415.90	7,744.77	7,584.10
Travel:	10,380.00	9.36	2,380.75	8,008.61	7,999.25
Total Direct Charges:	97,979.00	3,002.96	58,910.29	42,071.67	39,068.71
Overhead:	45,956.00	1,871.67	33,849.40	13,978.27	12,106.60
Total Charges and Balances:	143,935.00	4,874.63	92,759.69	56,049.94	51,175.31
SUMMARY: Total Expenditures to Date, E.E.S. and C.E.					92,759.69
Projected Expenditures to Date (from Activities Chart)					94,400.00
Difference (Projected Expenditures Less Actual Expenditures)					1,640.31

* Including encumbrances

LIBRARY DOES NOT HAVE

Monthly Progress Report 17, November, 1976



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

December 27, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Dr. Brian Chollar, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period November 1 through November 30, 1976.

Sincerely,

W. H. Burrows
Principal Research Scientist

/da
Attachment

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period November 1, 1976 through November 30, 1976

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 11/30/76</u>
Personal Services:	\$ 69,103.00	\$ 2,996.18	\$ 52,808.92	\$ 20,889.26	\$ 16,294.08
Retirement:	4,754.00	143.69	2,444.59	2,596.10	2,309.41
Materials and Supplies:	15,929.00	19,846.43	24,262.33	7,584.10	(8,333.33)
Travel:	9,280.00	1,874.30	4,255.05	7,999.25	5,024.95
Total Direct Charges:	99,066.00	24,860.60	83,770.89	39,068.71	15,295.11
Overhead:	44,869.00	2,037.41	35,886.81	12,106.60	8,982.19
Total Charges and Balances:	143,935.00	26,898.01	119,657.70	51,175.31	24,277.30
SUMMARY: Total Expenditures to Date, E.E.S. and C.E.					119,657.70
Projected Expenditures to Date (from Activities Chart)					99,900.00
Difference (Projected Expenditures Less Actual Expenditures)					19,757.70

* Including encumbrances



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

January 11, 1976

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Brian Chollar, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded
Asphalt Friction Course Lane Marking System, Report No. 18,
for the period 12/1/76 through 12/31/76.

Gentlemen:

Activities for the subject period were as follows:

PHASE I - Task B, Through Phase III

A. Progress

1. A monitoring of the retroreflectance for test sections on U.S. 50 west of Winchester, Va. was made on the night of December 8, 1976. Because of the below freezing temperatures, it was impossible to apply water to the pavement surface; thus, only "dry" readings were taken.
2. Data from the final readings of the Stone Mountain Freeway ramp test site were analyzed.
3. Some additional delineation material samples were made in the laboratory for replacement of the badly raveling areas at the U.S. 50 site.

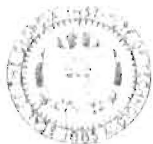
B. Work for January, 1977

1. Continue data reduction and analysis
2. Monitor the test sections on U.S. 50 west of Winchester, Va.

Respectfully submitted,

W. H. Burrows
Co-Principal Investigator

A-1753



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

January 31, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Dr. Brian Chollar, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period December 1 through
December 31, 1976.

Sincerely,

W. H. Burrows
Principal Research Scientist

/mh
Attachment

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period December 1, 1976 through December 31, 1976

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 12/31/76</u>
Personal Services:	\$ 69,103.00	\$ 2,196.66	\$ 55,005.58	\$ 16,294.08	\$ 14,097.42
Retirement:	4,754.00	25.67	2,470.26	2,309.41	2,283.74
Materials and Supplies:	15,929.00	124.95	24,387.28	(8,333.33)	(8,458.28)
Travel:	9,280.00	314.09	4,569.14	5,024.95	4,710.86
Total Direct Charges:	99,066.00	2,661.37	86,432.26	15,295.11	12,633.74
Overhead:	44,869.00	1,493.72	37,380.53	8,982.19	7,488.47
Total Charges and Balances:	143,935.00	4,155.09	123,812.79	24,277.30	20,122.21
SUMMARY: Total Expenditures to Date, E.E.S. and C.E.					123,812.79
Projected Expenditures to Date (from Activities Chart)					105,400.00
Difference (Projected Expenditures Less Actual Expenditures)					18,412.79

* Including encumbrances

A-1753

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

February 10, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Brian Chollar, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded
Asphalt Friction Course Lane Marking System, Report No. 19,
for the period 1/1/77 through 1/31/77.

Gentlemen:

Activities for the subject period were as follows:

PHASE I - Task B, Through Phase III

A. Progress

1. Monitoring of the retroreflectance of test sections on U.S. 50 west of Winchester, Va., had been planned for late in January 1977, but was postponed until February 3, 1977.
2. Data from the first two monitoring visits to the test sites in Virginia have been reduced and are currently being analyzed.
3. Additional delineation material samples were made in the laboratory for replacement of the badly ravelled areas at the U.S. 50 site.
4. A draft of the Interim Report was submitted for initial review.

B. Work for February, 1977

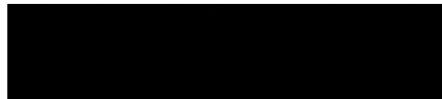
1. Monitor retroreflectance of Virginia test site.
2. Develop a document to request a contract modification.
3. Receive comments from FHWA concerning Interim Report.
4. Initiate assembly of final "camera ready" copy of Interim Report.

February 10, 1977

B. Work for February, 1977 (continued)

5. Reduce data from February 3, 1977 visit to Virginia test site.
6. Develop paper to be presented at the Salt Lake City Delineation Conference.
7. Make trip to and present paper at Salt Lake City Delineation Conference.

Respectfully submitted,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Co-Principal Investigator

WHB/cp

A-1753



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

February 28, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Dr. Brian Chollar, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period January 1 through
January 31, 1977.

Sincerely,

W. H. Burrows
Principal Research Scientist

/mh
Attachment

February 28, 1977

A-1753

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period January 1, 1977 through January 31, 1977

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 1/31/77</u>
Personal Services:	\$ 69,103.00	\$ 2,526.09	\$ 57,531.67	\$ 14,097.42	\$ 11,571.33
Retirement:	4,754.00	27.33	2,497.59	2,283.74	2,256.41
Materials and Supplies:	15,929.00	(3,319.22)	21,068.06	(8,458.28)	(5,139.06)
Travel:	9,280.00	-0-	4,569.14	4,710.86	4,710.86
Total Direct Charges:	99,066.00	(765.80)	85,666.46	12,633.74	13,399.54
Overhead:	44,869.00	1,717.74	39,098.27	7,488.47	5,770.73
Total Charges and Balances:	143,935.00	951.94	124,764.73	20,122.21	19,170.27
SUMMARY: Total Expenditures to Date, E.E.S. and C.E.					\$ 124,764.73
Projected Expenditures to Date (from Activities Chart)					110,900.00
Difference (Projected Expenditures Less Actual Expenditures)					(13,864.73)

* Including encumbrances

A-1753

ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

March 9, 1877

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Brian Chollar, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded
Asphalt Friction Course Lane Marking System, Report No. 20,
for the Period 2/1/77 through 2/28/77

Gentlemen:

Activities for the subject period were as follows:

PHASE I - Task B, Through PHASE III

A. Progress

1. Test sections in Virginia were visited, and porous delineation systems there were evaluated.
2. Various statistical procedures are being evaluated for use in analyzing the telephotometer data collected at the Virginia test site.
3. A technical presentation was developed and presented at the Delineation Conference in Salt Lake City.

B. Work for March, 1977

1. Continue reduction and analysis of data from Virginia site.
2. Revise the draft of the Interim Report
3. Make trip to Delineation Conference in Williamsburg, Virginia.

Respectfully submitted,



W. H. Burrows
Co-Principal Investigator

WHB/s

A-1753



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

March 24, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Dr. Brian Chollar, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period February 1 through
February 28, 1977.

Sincerely,

W. H. Burrows
Principal Research Scientist

/mh
Attachment

March 24, 1977

A-1753

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782
For the Period February 1, 1977 through February 28, 1977

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 2/28/77</u>
Personal Services:	\$ 69,103.00	\$ 1,469.86	\$ 59,001.53	\$ 11,571.33	\$ 10,101.47
Retirement:	4,754.00	50.29	2,547.88	2,256.41	2,206.12
Materials and Supplies:	15,929.00	175.22	21,243.28	(5,139.06)	(5,314.28)
Travel:	9,280.00	431.17	5,000.31	4,710.86	4,279.69
Total Direct Charges:	99,066.00	2,126.54	87,793.00	13,399.54	11,273.00
Overhead:	44,869.00	999.50	40,097.77	5,770.73	4,771.23
Total Charges and Balances:	143,935.00	3,126.04	127,890.77	19,170.27	16,044.23
SUMMARY: Total Expenditures to Date, E.E.S. and C.E.				\$ 127,890.77	
Projected Expenditures to Date (from Activities Chart)				116,400.00	
Difference (Projected Expenditures Less Actual Expenditures)				(11,490.77)	

* Including encumbrances

A-1753

ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

April 7, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Brian Chollar, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded
Asphalt Friction Course Lane Marking System, Report No. 21,
for the Period 3/1/77 through 3/31/77

Gentlemen:

Activities for the subject period were as follows:

PHASE I - Task B, Through PHASE III


A. Progress

1. A technical resume of research developments was presented at the Delineation Conference, held at Williamsburg, Virginia.
2. A request for a 6-month time extension and cost increase for the contract was submitted to FHWA, but was rejected.
3. Efforts are continuing in the statistical evaluation of retro-reflectance data from the Virginia test site.
4. Progress was made in revising the Interim Report.
5. Bill Maupin of the Virginia DOT was contacted and asked to arrange for the badly ravelling delineation stripes at the Virginia site to be replaced. The replacement will be done with Virginia DOT personnel; the cost will be paid from contract funds.

B. Work for April, 1977

1. Complete the revision of the Interim Report
2. Continue reduction and analysis of data from Virginia site

Respectfully submitted,


W. H. Burrows
Co-Principal Investigator

A-1753



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

April 19, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Dr. Brian Chollar, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period March 1 through
March 31, 1977.

Sincerely,

A solid black rectangular box used to redact the signature of W. H. Burrows.

W. H. Burrows
Principal Research Scientist

/cp
Attachment

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

April 19, 1977
A-1753

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOR-FH-11-8782
For the Period March 1, 1977 through March 31, 1977

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 2/28/77</u>
Personal Services:	\$ 69,103.00	\$ 1,782.66	\$ 60,784.19	\$ 10,101.47	\$ 8,318.81
Retirement:	4,754.00	25.57	2,573.45	2,206.12	2,180.55
Materials and supplies:	15,929.00	89.58	21,332.86	(5,314.28)	(5,403.86)
Travel:	9,280.00	259.86	5,260.17	4,279.69	4,019.83
Total Direct Charges:	99,066.00	2,157.67	89,950.67	11,273.00	9,115.33
Overhead:	44,869.00	1,212.21	41,309.98	4,771.23	3,559.02
Total Charges and Balances:	143,935.00	3,369.88	131,260.65	16,044.23	12,674.35
SUMMARY: Total Expenditures to Date, E.E.S. and C.E.	\$131,260.65				
Projected Expenditures to Date (from Activities Chart)	121,900.00				
Difference (Projected Expenditures Less Actual Expenditures)	(9,360.65)				

* Including encumbrances



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

May 10, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Mr. Brian Chollar, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

Subject: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded
Asphalt Friction Course Lane Marking System, Report No. 22,
for the Period 4/1/77 through 4/30/77

Gentlemen:

Activities for the subject period were as follows:

PHASE I - Task B, through PHASE III

A. Progress

1. Efforts are continuing in the statistical evaluation of retro-reflectance data from the Virginia test site.
2. The Phase II test site was visited and closely examined on April 6, 1977 by Q. L. Robnett and Ed Harrigan, FHWA.
3. Revisions were made to Interim Report.

B. Work for May, 1977

1. Continue reduction and analysis of data from Virginia test site.
2. Plan visit to Virginia test site for early June.
3. Complete revisions to the Interim Report.

Respectfully submitted,

W. H. Burrows
Co-Principal Investigator

WHB/bn



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

May 17, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

Attention: Dr. Brian Chollar, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period April 1 through
April 31, 1977.

Sincerely,

W. H. Burrows
Principal Research Scientist

/cp
Attachment

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

May 17, 1977

A-1753

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOR-FH-11-8782
For the Period April 1, 1977 through April 30, 1977

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 4/30/77</u>
Personal Services:	\$ 69,103.00	\$ 636.06	\$ 61,420.25	\$ 8,318.81	\$ 7,682.75
Retirement:	4,754.00	(18.20)	2,555.25	2,180.55	2,198.75
Materials and Supplies:	15,929.00	(11.48)	21,321.38	(5,403.86)	(5,392.38)
Travel:	9,280.00	13.60	5,273.77	4,019.83	4,006.23
Total Direct Charges:	99,066.00	619.98	90,570.65	9,115.33	8,495.35
Overhead:	44,869.00	432.52	41,742.50	3,559.02	3,126.50
Total Charges and Balances:	143,935.00	1,052.50	132,313.15	12,674.35	11,621.85

SUMMARY: Total Expenditures to Date, E.E.S. and C.E. \$132,313.15
Projected Expenditures to Date (from Activities Chart) 127,600.00
Difference (Projected Expenditures Less Actual Expenditures) (4,713.15)

*Including encumbrances



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

A-1753

June 15, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

ATTENTION: Mr. Brian Chollar, HRS-22
Contract Manager

Mr. Thomas Sullivan, HCP-13
Contract Administrator

SUBJECT: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded
Asphalt Friction Course Lane Marking Material, Report No. 23,
For the period 1 May 1977 through 31 May 1977

Gentlemen:

Activities for the subject period were as follows:

PHASE I -- Task B, through PHASE III

A. Progress

1. Final revisions were made on the Interim Report.
2. Efforts continued relative to reduction and evaluation of retroreflectance data from the Virginia test site.

B. Work for June, 1977

1. The Virginia test site will be visited for the purposes of examining the condition of the test stripes there and monitoring their retroreflectance.
2. Reduction and analysis of data from the Virginia test site will continue.

Respectfully submitted,

W. H. Burrows
Co-Principal Investigator

WHB/bn

A-1753



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

June 21, 1977

DEPARTMENT OF TRANSPORTATION
Federal Highway Administration
Washington, D. C. 20590

Attention: Dr. Brian Chollar, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOT-FH-11-8782

Gentlemen:

Attached is the subject report for the period May 1 through May 31, 1977.

Sincerely,

A black rectangular box redacting the signature of W. H. Burrows.

W. H. Burrows
Principal Research Scientist

WHB/s
Encl.

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

June 14, 1977

A-1753

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOR-FH-11-8782
For the Period May 1, 1977 through May 31, 1977

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 4/30/77</u>
Personal Services	69,103.00	703.06	62,123.31	7,682.75	6,979.69
Retirement	4,754.00	--	2,555.25	2,198.75	2,198.75
Materials and Supplies	15,929.00	(7.76)	21,313.62	(5,392.38)	(5,384.62)
Travel	9,280.00	--	5,273.77	4,006.23	4,006.23
Total Direct Charges	99,066.00	695.30	91,265.95	8,495.35	7,800.05
Overhead	44,869.00	478.09	42,220.59	3,126.50	2,648.41
Total Charges and Balances	143,935.00	1,173.39	133,486.54	11,621.85	10,448.46
SUMMARY: Total Expenditures to Date, E. E. S. and C. E.				133,486.54	
Projected Expenditures to Date (from Activities Chart)				137,900.00	
Difference (Projected Expenditures Less Actual Expenditures)				4,413.46	

*Including Encumbrances



ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

July 12, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

ATTENTION: Mr. Brian Chollar, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

SUBJECT: Monthly Progress Report, Contract DOT-FH-11-8782, Open-
Graded Asphalt Friction Course Lane Marking Material, Report
Number 24, for the period 1 June 1977 through 30 June 1977.

Gentlemen:

Activities for the subject period were as follows:

PHASE I -- Task B, through PHASE III


A. Progress

1. Brian Chollar and Quentin Robnett visited and examined Stone Mountain Freeway test site, June 10, 1977.
2. The Interim Report was discussed with Brian Chollar, Contract Manager. Suggestions for revisions were made.
3. The Winchester, Virginia test sites were visited (June 21, 1977) and examined. Dry and wet night retroreflectance readings were taken.

B. Work for July, 1977

1. Make final revision to Interim Report.
2. Continue reduction and analysis of data from Virginia test site.
3. Initiate work on final report.

Respectfully submitted,


W. H. Burrows
Co-Principal Investigator

WHB/bn

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

July 21, 1977

A-1753

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOR-FH-11-8782
For the Period June 1, 1977 through June 30, 1977

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 6/30/77</u>
Personal Services	69,103.00	272.53	62,395.84	6,979.69	6,707.16
Retirement	4,754.00	--	2,555.25	2,198.75	2,198.75
Materials and Supplies	15,929.00	57.10	21,370.72	(5,384.62)	(5,441.72)
Travel	9,280.00	10.80	5,284.57	4,006.23	3,995.43
Total Direct Charges	99,066.00	340.43	91,606.38	7,800.05	7,459.62
Overhead	44,869.00	185.32	42,405.91	2,648.41	2,463.09
Total Charges and Balances	143,935.00	525.75	134,012.29	10,448.46	9,922.71
SUMMARY: Total Expenditures to Date, E. E. S. and C. E.			134,012.29		
Projected Expenditures to Date (from Activities Chart)			143,900.00		
Difference (Projected Expenditures Less Actual Expenditures)			9,887.71		

*Including Encumbrances

LIBRARY DOES NOT HAVE

Monthly Progress Report 25, July, 1977

Monthly Financial Report, July, 1977



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

September 1, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

ATTENTION: Mr. Brian Chollar, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

SUBJECT: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded Asphalt Friction Course Lane Marking Material, Report No. 26, for the Period 1 August through 31 August 1977

Gentlemen:

Activities for the subject period were as follows:

PHASE I - Task B through PHASE IV

A. Progress

1. Final statistical analyses of telephotometer readings from the Virginia test site were completed.
2. A technical paper converging early project activities was developed and submitted to the Transportation Research Board.
3. A proposed budget amendment was submitted to FHWA.

B. Work for September, 1977

1. Continue work on preparation of final report.
2. Ship prefabricated porous delineator blocks to Brian Chollar.

Respectfully submitted,

[Redacted Signature]

W. H. Burrows
CoPrincipal Investigator

WHB/s

Department of Transportation
Federal Highway Administration
Washington, D.C. 20590

September 16, 1977

A-1753

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOR-FH-11-8782
For the Period August 1, 1977 through August 31, 1977

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 8/31/77</u>
Personal Services	69,103.00	3,600.00	65,995.84	6,707.16	3,107.16
Retirement	4,754.00	277.76	2,869.41	2,198.75	1,884.59
Materials and Supplies	15,929.00	581.56	21,501.36	(5,442.80)	(5,572.36)
Travel	9,280.00	347.36	5,631.93	3,995.43	3,648.07
Total Direct Charges	99,066.00	--	95,998.54	7,458.54	3,067.46
Overhead	44,869.00	2,448.01	44,853.91	2,463.09	15.09
Total Charges and Balances	143,935.00	7,254.69	140,852.45	9,921.63	3,082.55

SUMMARY: Total Expenditures to Date, E. E. S. and C. E. 140,852.45

Projected Expenditures to Date (from Activities Chart) 143,935.00

Difference (Projected Expenditures Less Actual Expenditures. 3,082.55

* Including Encumbrances



ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

October 10, 1977

Department of Transportation
Federal Highway Administration
Washington, D. C. 20590

ATTENTION: Mr. Brian Chollar, HRS-22 Mr. Thomas Sullivan, HCP-13
Contract Manager Contract Administrator

SUBJECT: Monthly Progress Report, Contract DOT-FH-11-8782, Open-Graded Asphalt Friction Course Lane Marking Material, Report No. 27, for the Period 1 September through 30 September, 1977

Gentlemen:

Activities for the subject period were as follows:

PHASE I - TASK B through PHASE IV


A. Progress

1. Sections in Final Report concerning Phases I, II and III have been completed
2. No word has yet been received concerning proposed budget amendment

B. Work for October, 1977

1. Complete draft of Final Report
2. Ship prefabricated porous delineator blocks to Brian Chollar

Respectfully submitted,


W. H. Burrows
CoPrincipal Investigator

WHB/s

Department of Transportation
Federal Highway Administration
Washington, D.C. 20590

October 12, 1977

A-1753

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOR-FH-11-8782
For the Period September 1, 1977 through September 30, 1977

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 9/30/77</u>
Personal Services	69,103.00	258.58	66,254.42	3,107.16	2,848.58
Retirement	4,754.00	--	2,869.41	1,884.59	1,884.59
Materials and Supplies	15,929.00	--	21,501.36	(5,572.36)	(5,572.36)
Travel	9,280.00	--	5,631.93	3,648.07	3,648.07
Total Direct Charges	99,066.00	258.58	96,257.12	3,067.46	2,808.88
Overhead	44,869.00	175.83	45,029.74	15.09	15.09
Total Charges and Balances	143,935.00	434.41	141,286.86	3,082.55	2,823.97

SUMMARY: Total Expenditures to Date, E. E. S. and C. E.141,286.86

Projected Expenditures to Date (from Activities Chart)143,935.00

Difference (Projected Expenditures Less Actual Expenditures. . . . 2,648.14

*Including Encumbrances

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Monthly Progress Report 28, October, 1977

Department of Transportation
Federal Highway Administration
Washington, D.C. 20590

November 10, 1977

A-1753

Attention: Mr. Stewart Spellman, HRS-22, Contract Manager
Mr. Thomas Sullivan, HCP-13, Contract Administrator

Subject: Monthly Financial Report, Contract DOR-FH-11-8782
For the Period October 1, 1977 through October 31, 1977

	<u>Budget Amount</u>	<u>Expenditures* This Period</u>	<u>Expenditures* To Date</u>	<u>Previous Free Balance</u>	<u>Free Balance As of 10/31/77</u>
Personal Services	69,103.00	258.58	66,513.00	2,848.58	2,590.00
Retirement	4,754.00	--	2,869.41	1,884.59	1,884.59
Materials and Supplies	15,929.00	--	21,509.80	(5,572.36)	(5,580.80)
Travel	9,280.00	--	5,631.93	3,648.07	3,648.07
Total Direct Charges	99,066.00	258.58	96,524.14	2,808.88	2,541.86
Overhead	44,869.00	175.83	45,205.57	15.09	(336.57)
Total Charges and Balances	143,935.00	434.41	141,729.71	2,823.97	2,205.29

SUMMARY: Total Expenditures to Date, E. E. S. and C. E. 141,729.71

Projected Expenditures to Date (from Activities Chart) 143,935.00

Difference (Projected Expenditures Less Actual Expenditures. 2,205.29

*Including Encumbrances