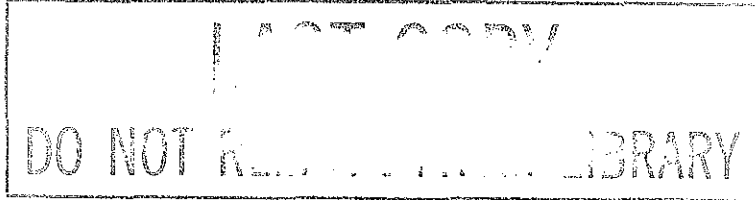


R253

MICHIGAN  
STATE HIGHWAY DEPARTMENT  
Charles M. Ziegler  
State Highway Commissioner



SUPPLEMENTAL PROGRESS REPORT

ON

EXPERIMENTAL SLAG BITUMINOUS CONCRETE PROJECT

Construction Project M 82-42, C2 & C3

by

Paul Milliman

(This supplements the Progress Report  
on above project by Paul J. Serafin, Bituminous  
Testing Engineer, Ann Arbor Laboratory, dated November 1, 1955)

Highway Research Project 55 D-22

Progress Report 1

Research Laboratory  
Testing and Research Division  
Report No. 253  
February 6, 1956

SUPPLEMENTAL PROGRESS REPORT  
ON  
EXPERIMENTAL SLAG BITUMINOUS CONCRETE PROJECT

On September 9, 1955 the Research Laboratory was requested to participate in the study of an experimental slag bituminous concrete resurfacing project. This study is being conducted by Mr. Paul Serafin, Bituminous Testing Engineer of the Ann Arbor Laboratory. The area of resurfacing to be studied is on US-112, Michigan Avenue in Dearborn and has been designated as construction project M-82-42, C2 & C3.

The phase of this project to be carried out by the Research Laboratory includes pre- and post-resurfacing condition and roughness surveys and post-resurfacing skid resistance measurements.

PURPOSE

The objective of this study is to compare the field performance of bituminous resurfacing materials containing (1) coarse and fine slag aggregates, (2) slag coarse aggregate and natural fine aggregate, and (3) natural coarse and fine aggregates.

The performance comparison will be evaluated with respect to the ability of the resurfacing materials to resist distortion and to resist the reflection of base pavement conditions, i. e., cracks, faults, etc., and an evaluation of the progressive surface roughness and skid resistance trends will be made.

The pre-resurfacing and the initial post-resurfacing surveys and tests were completed on October 7, 1955 and the details and results of this work are contained in this report.

CONDITION SURVEY

A condition survey was conducted on the pavement surface September 13, 1955 prior to its resurfacing. The results of the survey are appended as Figures 3, 4 and 5 at the end of this report.

ROUGHNESS SURVEY

The surface roughness determinations were made using the MSHD Roughometer. Readings were taken in each wheel track of each lane, excepting the two outside parking lanes. A minimum of three tests were run in each wheel track.

Because of the extremely poor condition of the old pavement surface and the necessity for patching, chipping, etc., to prepare it for the bituminous recapping, it was decided to exclude pre-surfacing roughness runs.

Runs of this type, where extreme roughness is encountered, are detrimental to the functioning and accuracy of the Roughometer instrument.

### Test Results

The plan used for the roughness tests and the tabulated results are shown in Figure 2.

The limits of the roughness test sections do not all agree exactly with the project limits. This is a matter of practical necessity in making the actual runs, i. e., getting the test vehicle to proper speed and alignment before starting recording equipment. However, at least 80% or more of each section was tested.

### SKID RESISTANCE TESTS

The coefficients of friction of the three test areas were computed using the standard stopping distance formula:

$$\text{Coefficient of Friction} = \frac{V^2}{30S}$$

Where:                    V = velocity of vehicle in mph.  
                              S = stopping distance in feet.

### Testing Details and Procedure

The skid tests were conducted during a light rain, between 1:00 and 2:00 p. m., on October 7, 1955. In each case the tests were conducted in the second lane from the curb on both the east and west bound lanes of each test section.

The test vehicle was a 1954 Ford (state vehicle 01-611) weighing a total of 4000 lbs. with 2200 lbs. and 1800 lbs. on the front and rear axles, respectively. This vehicle was equipped with Goodyear Super Cushion Deluxe - 670 x 15 tires which were adjusted to exactly 30 psi. pressure.

The velocity of the vehicle at the time the wheels were locked was exactly 20 mph. for each test skid.

The locations and results of these tests are tabulated in Table I.

### SUMMARY

A complete evaluation of this project with respect to its skidding and roughness properties and its physical condition will not be completed until a future date, after a number of periodic tests. These tests will be conducted at approximate one year intervals.

TABLE I

Section 1				Section 2				Section 3			
Construction Project 82-42, C2 (Bailey St. to US-24) Slag Coarse Agg. and Fine Aggregate				Construction Project 82-42, C3 (US-24 to Outer Drive) Slag Coarse Aggregate and Natural Fine Aggregate				Construction Project 82-42, C3 (Outer Drive to Nowlin St.) Natural Coarse Aggregate and Natural Fine Aggregate			
East Bound		West Bound		East Bound		West Bound		East Bound		West Bound	
Station	Stopping Distance (feet)	Station	Stopping Distance (feet)	Station	Stopping Distance (feet)	Station	Stopping Distance (feet)	Station	Stopping Distance (feet)	Station	Stopping Distance (feet)
1 + 00	12.7	4 + 80	13.9	22 + 70	13.4	24 + 40	12.6	42 + 50	13.4	44 + 50	13.5
5 + 20	13.2	7 + 60	12.3	27 + 60	20.6	28 + 20	15.7	46 + 25	16.9	46 + 00	14.2
7 + 50	12.2	12 + 50	13.0	32 + 20	16.2	32 + 80	12.0	50 + 25	16.0	52 + 30	14.5
						38 + 20	12.0				
Average E. & W. Bound = 12.9 Coefficient of Friction = 1.03				Average E. & W. Bound = 14.6 Coefficient of Friction = 0.91				Average E. & W. Bound = 14.8 Coefficient of Friction = 0.90			

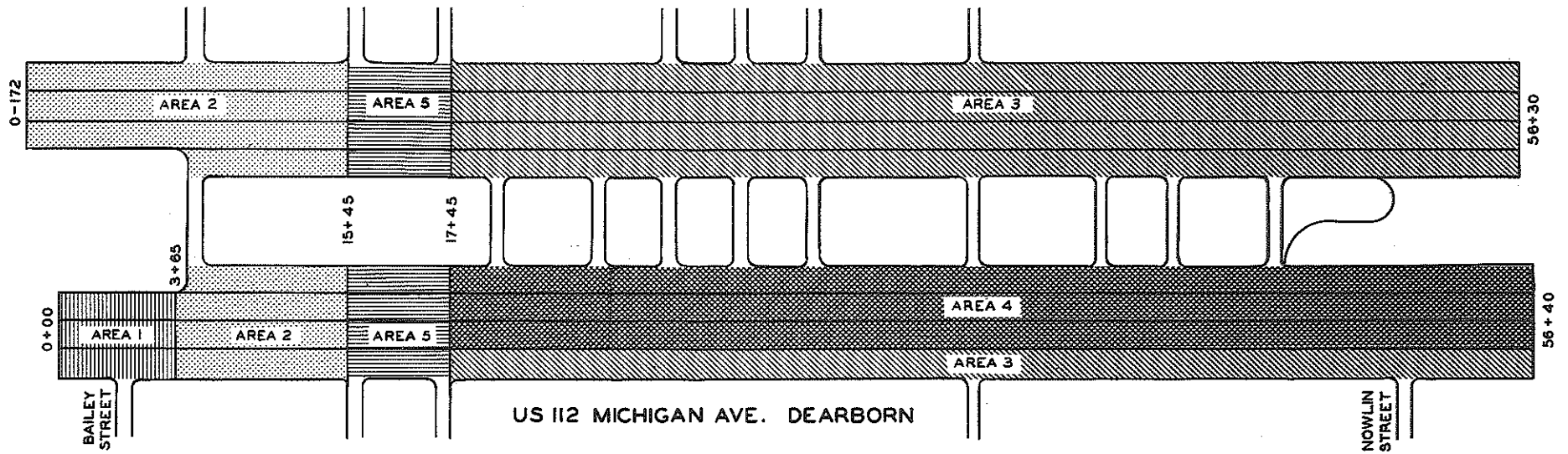
SKID RESISTANCE DETERMINATIONS

US-112 Michigan Ave., Dearborn

Experimental Slag Bituminous Concrete Project

Construction Project M 82-42, C2 & C3

Research Project 54 D-22

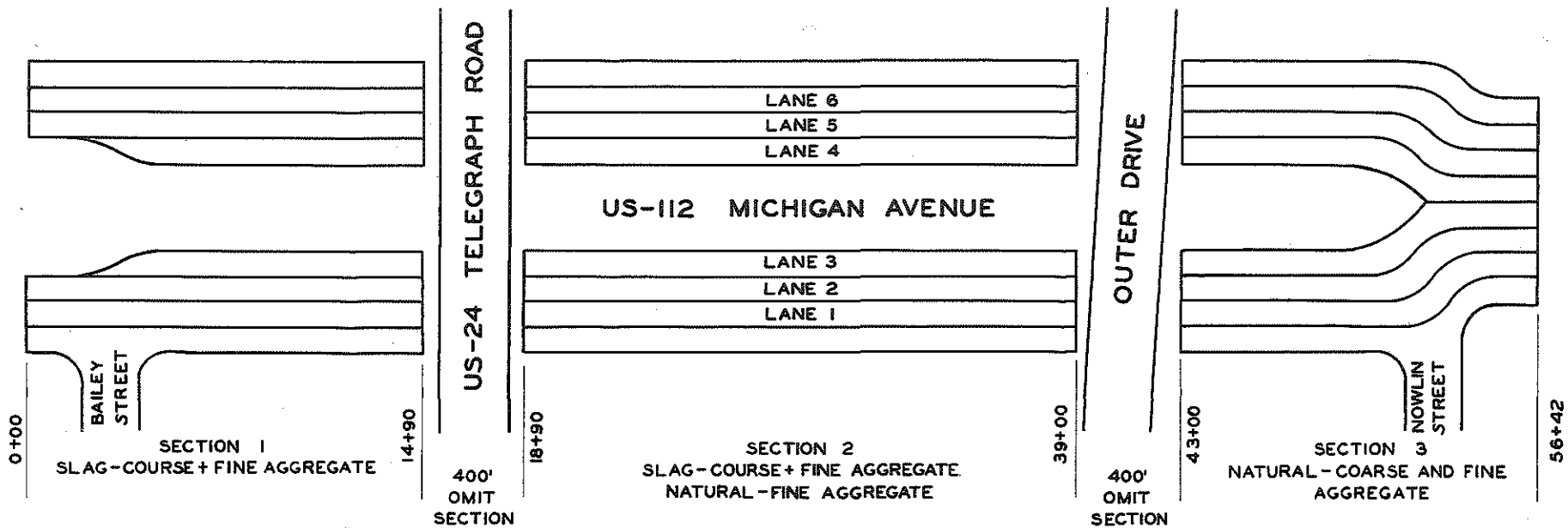


AREA NO.	PROJECT NO.	YEAR CONSTR.	SLAB THICKNESS	SLAB WIDTH	LOAD TRANSFER		REINFORCEMENT
					EXPANSION	CONTRACTION	
1	82-8, C3	1932	10"	30'	NONE	NONE	YES TYPE UNKOWN
2	82-8, C5	1938	10'	40'	TRANSLODE	NONE	MESH
3	82-7, C3	1935	UNKOWN	40' AND 10'	TRANSLODE	NONE	MESH
4	82-7, C2	1932	10'	30'	NONE	NONE	YES TYPE UNKOWN
5	GRADE SEPARATION (OVER B8 OF 82-3, 1a + 1b) I BEAM 2 AT 47' 9" - 2 AT 50' CLEAR 1937						

PLAN AND DATA OF ORIGINAL PAVEMENT CONSTRUCTION  
 EXPERIMENTAL SLAG BITUMINOUS RESURFACING  
 DEARBORN

US112 MICHIGAN AVE. (APPROX. BAILEY TO NOWLIN ST'S.)  
 CONSTRUCTION PROJECT 82-42, C2+3  
 RESEARCH PROJECT 55 D - 22

FIGURE 1



NOTE: IN EVERY CASE WHEEL TRACK 1 IS THE SOUTH TRACK OF A LANE AND WHEEL TRACK 2 IS THE NORTH TRACK.

OUTSIDE LANES ARE NOT INCLUDED IN TEST RUNS BECAUSE OF PARKED CARS.

LANE		1		2		3		4		5		6		AVERAGE
		1	2	1	2	1	2	1	2	1	2	1	2	
SECTION	1	95	95	95	99	86	96	102	86	102	102	88	102	96
	2	102	94	126	120	94	96	94	80	94	94	94	102	99
	3	121	125	113	137	117	133	141	129	125	117	101	113	123

ALL VALUES SHOWN ARE THE AVERAGE OF AT LEAST THREE ROUGHOMETER READINGS. VALUES ARE IN UNITS/MILE.

EXPERIMENTAL SECTIONS AND ROUGHOMETER DATA  
EXPERIMENTAL SLAG BITUMINOUS RESURFACING  
DEARBORN

US-112 MICHIGAN AVE. (APPROX. BAILEY TO NOWLIN ST'S.)  
CONSTRUCTION PROJ. - 82-42, C2+3 RESEARCH PROJ. - 55-D-22 TESTING DATE - OCT. 6, 1955

FIGURE 2

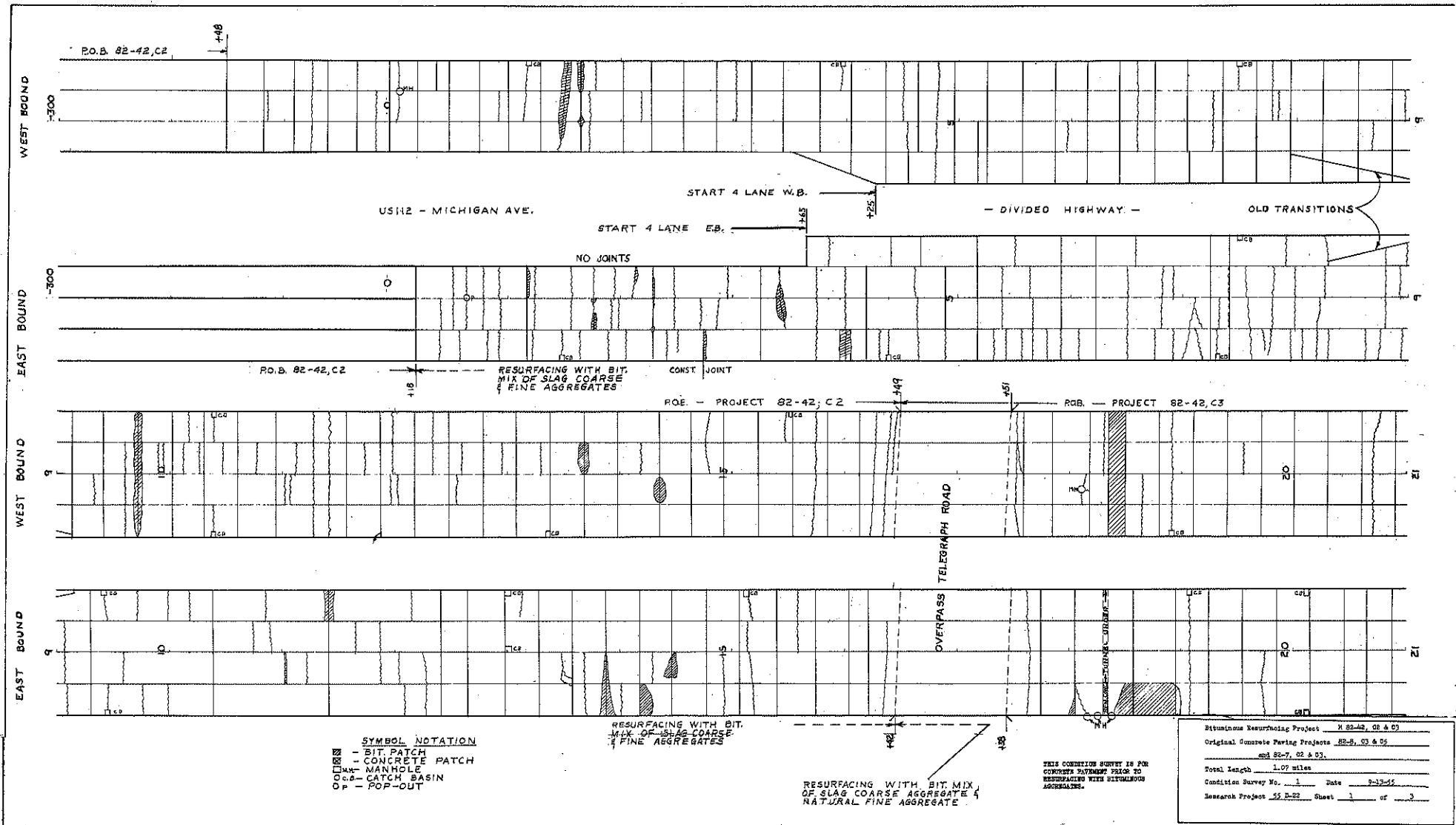


FIGURE 3

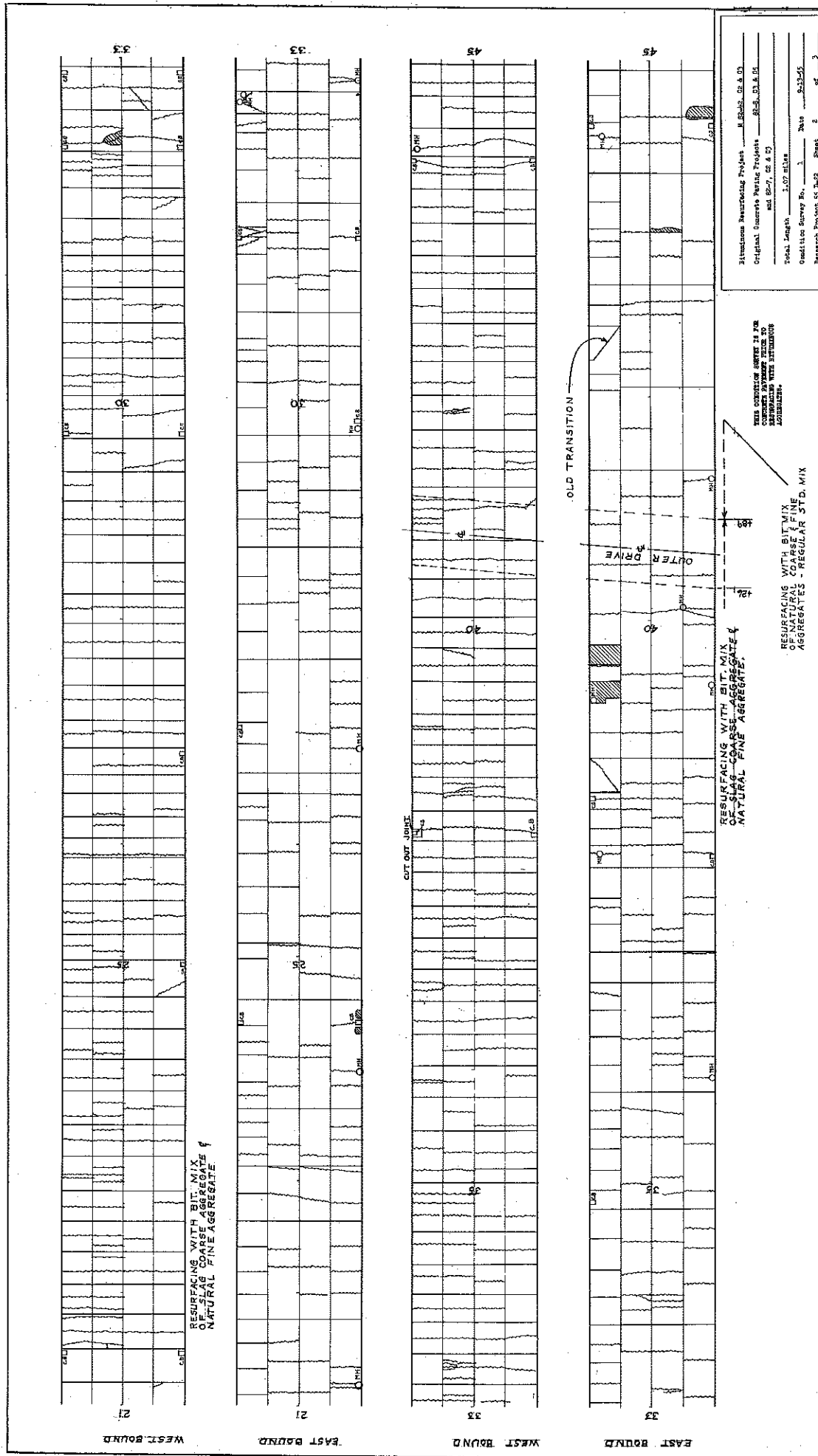
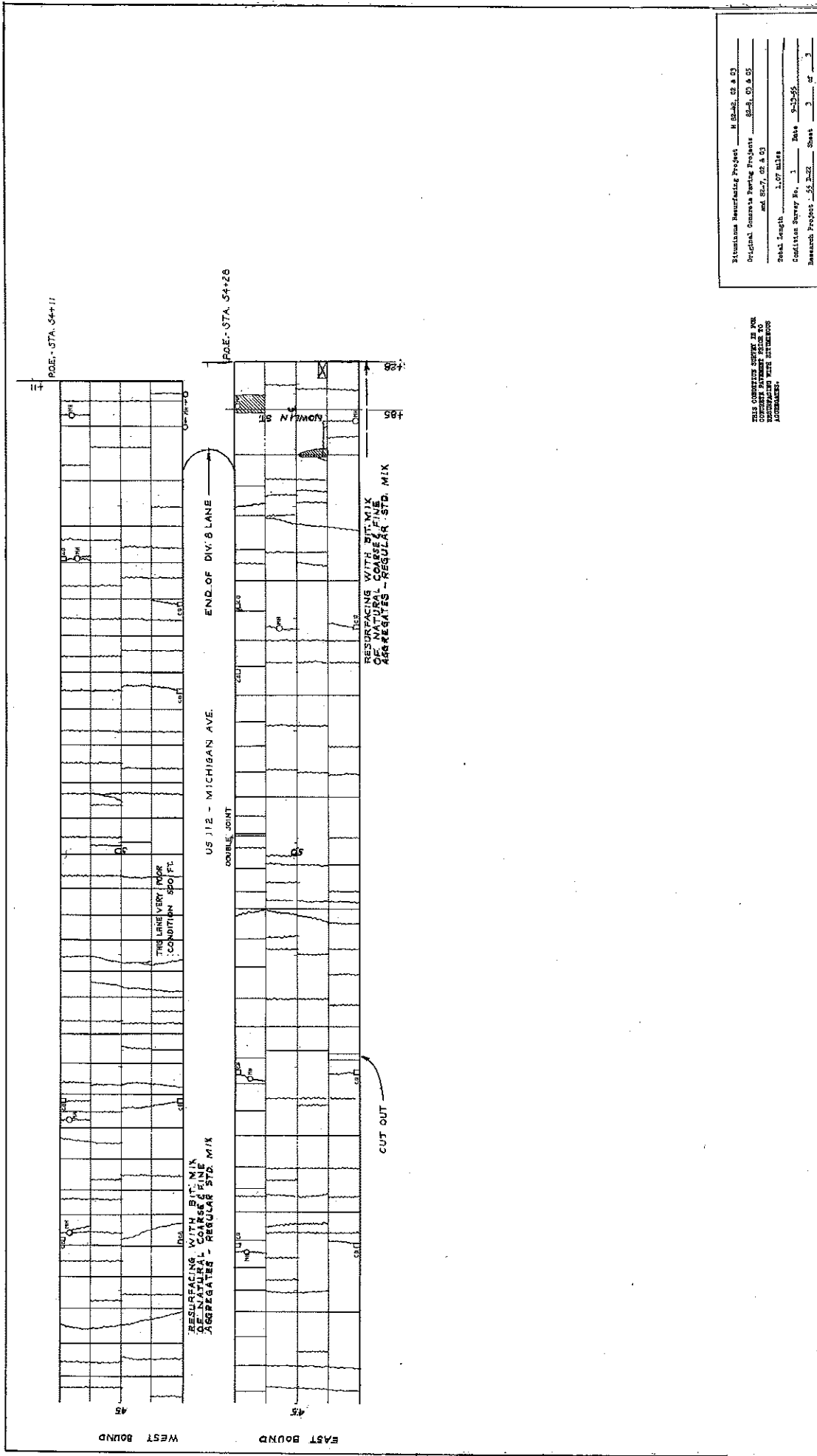


FIGURE 4





Situations Resurfacing Project	H 82-10, 02 & 03
Original Contract Particulars	82-1, 02 & 03
and 82-7, 02 & 03	
Total Length	1.07 miles
Condition Survey No.	1
Date	9-13-55
Research Project	54-322
Sheet	3 of 3

THIS CONTRACT SUPPLY IS FOR  
RESURFACING WITH BITUMEN  
AGGREGATES.

FIGURE 5