

MICHIGAN
STATE HIGHWAY DEPARTMENT
LANSING 13

Charles M. Ziegler
State Highway Commissioner

INTEROFFICE COMMUNICATION

July 3, 1952

TO: W. W. McLaughlin
Testing and Research Engineer

SUBJECT: Lincoln Stone as a Material for Bituminous Concrete Resurfacing.
Research Project 51 A-14. Report No. 179

At the request of C. J. Olsen, Materials Engineer, a field condition survey has been made of sixteen bituminous resurfacing projects in which Lincoln Stone was used as the coarse aggregate. Two bituminous resurfacing projects with limestone aggregates from other sources were included for comparison. A complete list of the projects included in the field survey, together with pertinent data, will be found in Table I. The survey was made on June 18, 1952, by the writer, accompanied by William Broughton, and on June 19 and 20 by Mr. Broughton.

The purpose of this study was to observe the past service performance of Lincoln Stone in bituminous concrete resurfacing projects as a basis for determining whether or not it should be permitted on future bituminous resurfacing work.

The survey disclosed no outstanding evidence to warrant the exclusion of Lincoln Stone from bituminous concrete resurfacing work. All projects surveyed were in excellent physical condition. Pictorial evidence supporting this fact is attached.

The Lincoln Stone projects surveyed varied in age from two to five years. The one most noticeable but not serious surface condition observed on several of the Lincoln Stone projects was pitting. Evidently this condition was caused by displacement of the softer, non-durable aggregate particles under freeze-thaw action and traffic, augmented no doubt by chloride salts, since the worst of such conditions were observed on Project U 13-51, C1, M-96 West Michigan Avenue, Battle Creek (see picture 3), and on Project M 8-32, C2, M-66 Nashville (see picture 13).

This pitting action is apparently confined to the surface of the bituminous course only and there is no evidence that it has any detrimental effect on the structural strength of the complete bituminous concrete surface coat. In fact, in areas under heavy truck traffic, these voids eventually close and the surface becomes smooth.

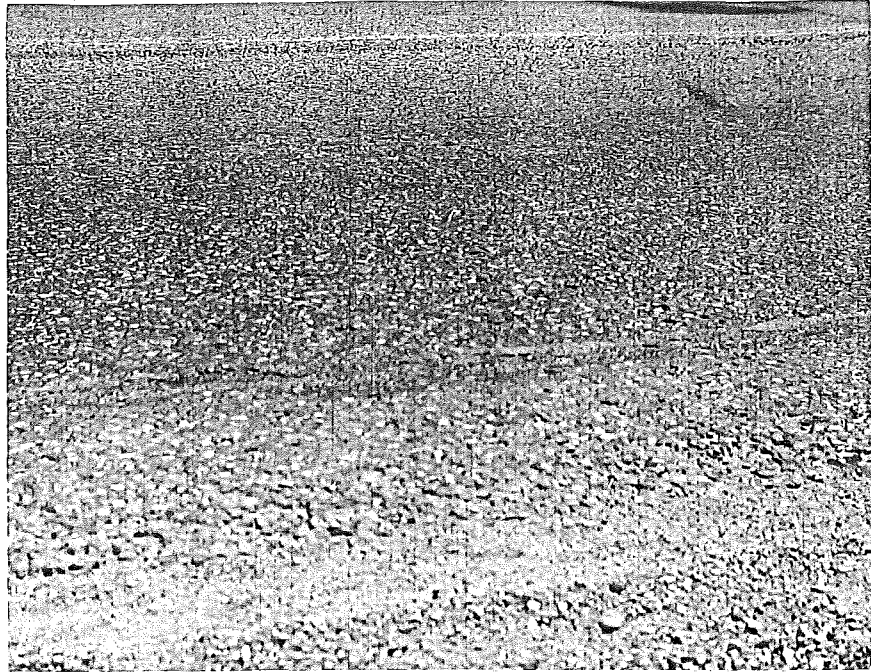
E. A. Finney
Asst. Testing and Research Engr.
in charge of Research

EAF:em

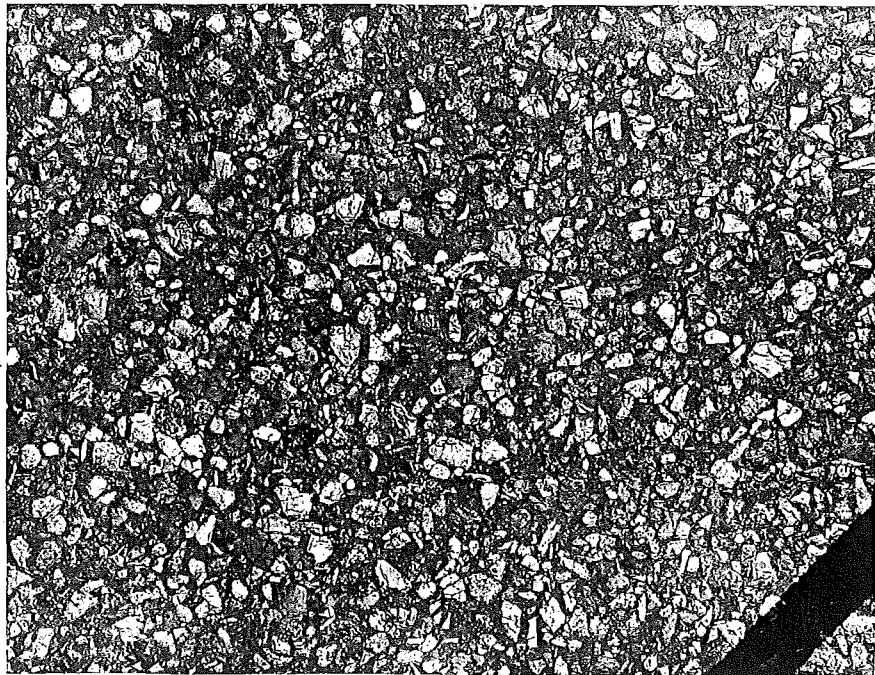
TABLE I

SUMMARY OF DATA PERTAINING TO LINCOLN STONE SURVEY

Fig. No.	Project No.	Year Constr.	Length Miles	Source of Aggregate	Specifications	Location	Condition
1	M 11-23, C4	1947	2.031	Lincoln	26A Mod. ('42)	US-12 from M-140 West	Slight Pitting
2	*M 11-20, C3	1947	8.0	Dolese & Shepard	26A Mod. ('42)	US-112, New Buffalo to Galen	No pitting
3	U 13-51, C2	1947	1.852	Lincoln	26A Mod. ('42)	M-96, in N.W. sec. of Battle Creek	Heavy pitting
4	M 80-14, C4-5	1947	8.423	Lincoln	26A Mod. ('42)	US-12 through Lawrence and Hartford	Slight pitting
5	M 8-17, C3	1948	1.0	Lincoln	26A Mod. ('42)	M-37 from S. County Line North	Medium pitting
6	M 13-27, C14	1948	0.6	Lincoln	26A Mod. ('42)	US-12 from Kalamazoo County Line East	No pitting
7	M 14-4, C8	1948	9.0	Lincoln	26A Mod. ('42)	M-60, S.W. of Cassopolis	No pitting
8	M 14-15, C12	1948	1.249	Lincoln	26A Mod. ('42)	US-112, East from M-119	No pitting
9	M 39-30, C4	1948	0.189	Lincoln	26A Mod. ('42)	US-12 in Kalamazoo near Bl of 39-7-2	No pitting
10	M 39-48, C1	1948	3.259	Lincoln	26A Mod. ('42)	From Oshtemo to Kalamazoo County Secondary	No pitting
11	M 78-2, C6	1948	3.62	Lincoln	26A Mod. ('42)	US-131 in village of Constantine	Slight Pitting
12	M 78-14, C6	1948	7.586	Lincoln	26A Mod. ('42)	US-12, Mottville to White Pigeon	Slight pitting
13	M 8-32, C2	1949	0.393	Lincoln	26A Mod. ('42)	M-66, in village of Nashville	Heavy pitting
14	M 13-6, C2	1950	- -	Lincoln	25A ('50)	US-12 and 127, Circle in Marshall	Slight pitting
15	M 13-58, C1	1950	1.573	Lincoln	25A ('50)	US-12 and M-96 in Battle Creek	No pitting
16	M 13-9, C3	1950	0.246	Lincoln	25A ('50)	M-66 and 78, two mi. S. of Barry County Ln.	Slight pitting
17	SS 80-20, C4	1950	4.019	Lincoln	25A ('50)	M-119, Lawton to Paw Paw	Slight pitting
18	*78-11, C4	1951	12.85	Monon	25A Mod. ('50)	M-60, Three Rivers to Mendon	No pitting

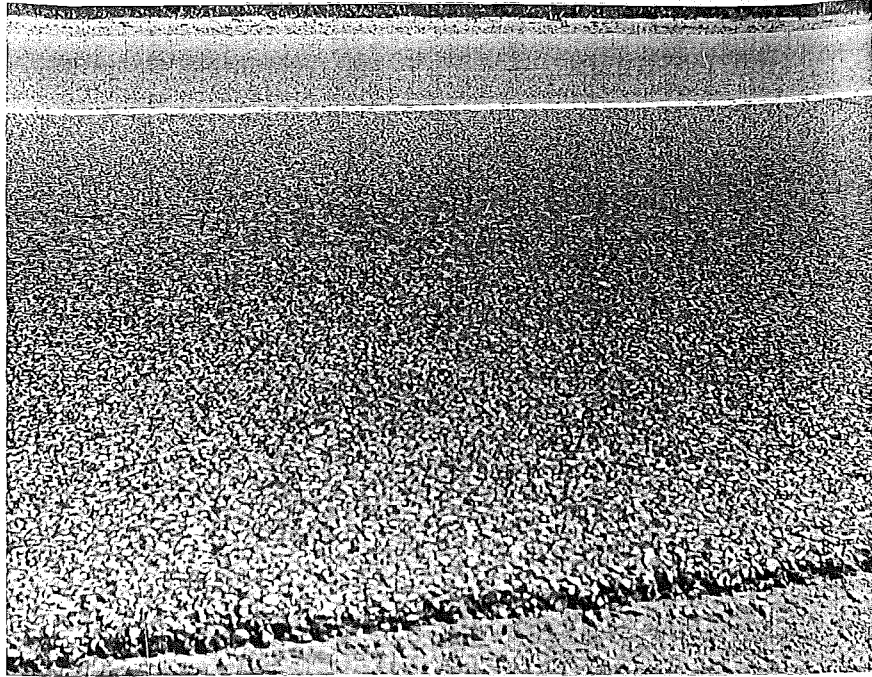


A. Typical condition of surface; slight pitting at sides.

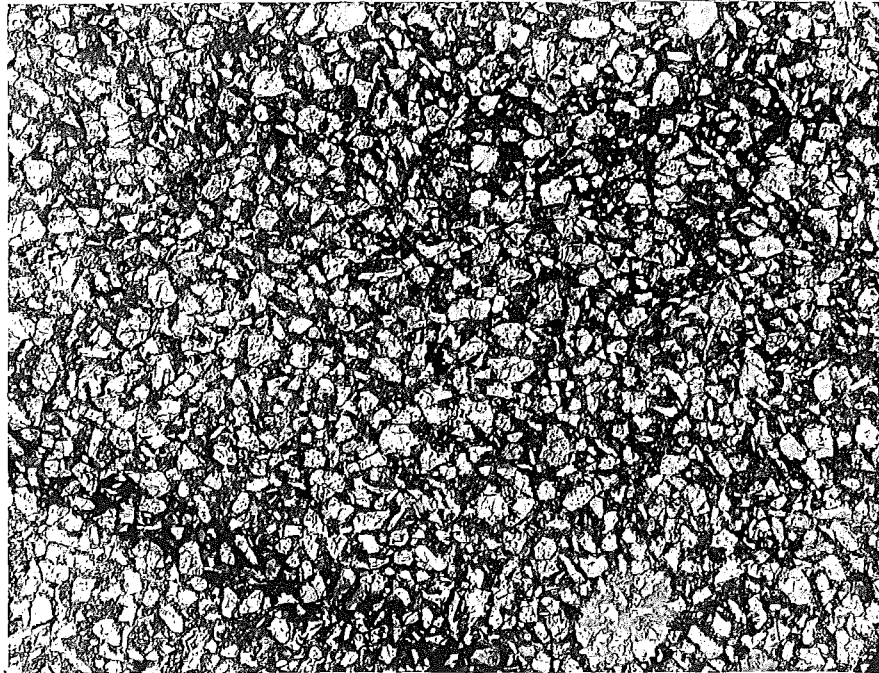


B. View of surface showing typical condition of aggregate.

Lincoln Stone 26A Mod. M 11-23, C4 - 1947
US-12 from M-140 West 6-19-52

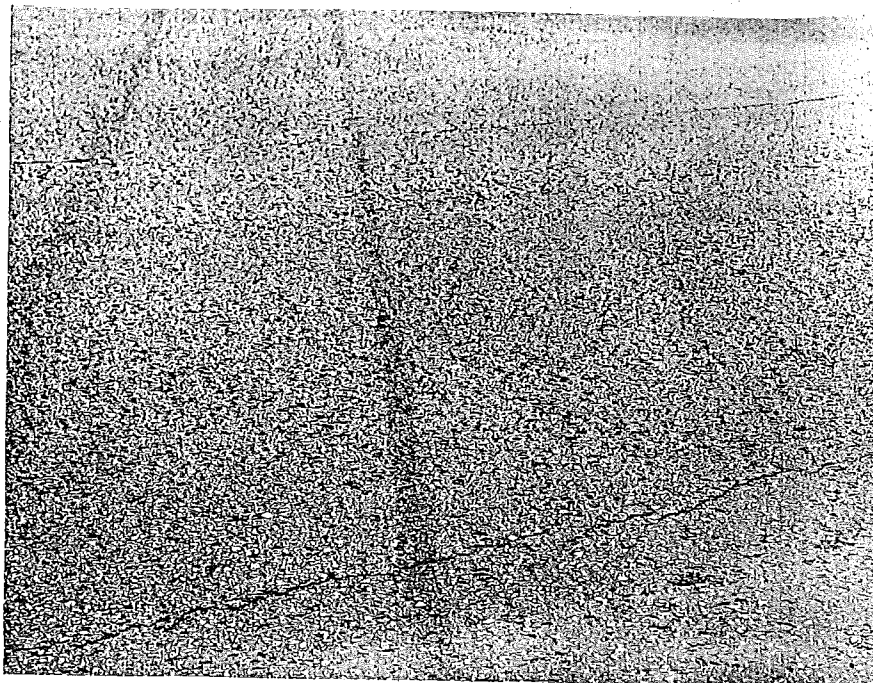


A. Typical condition of surface. No pitting.

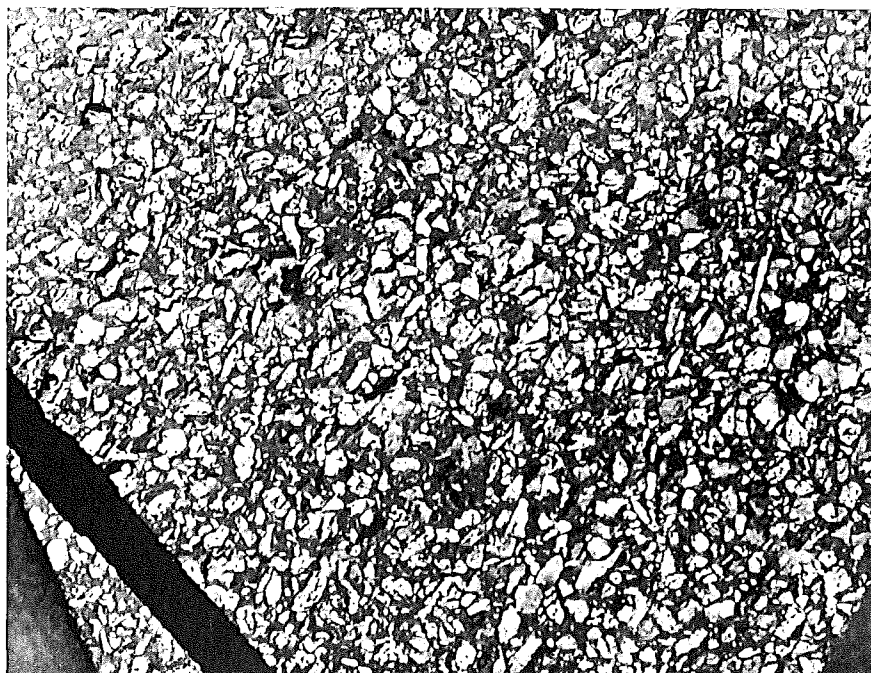


B. View showing typical condition of aggregate.

Dolese & Shepard Stone 26A Mod. M 11-20, C3 - 1947
US-112 New Buffalo to Galen 6-19-52



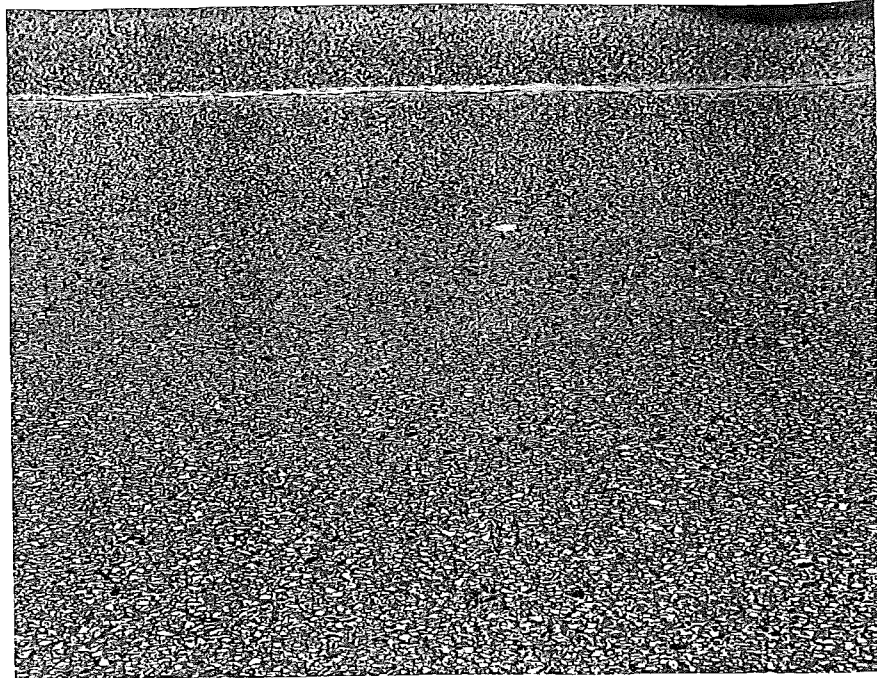
A. Typical condition of surface showing heavy pitting.



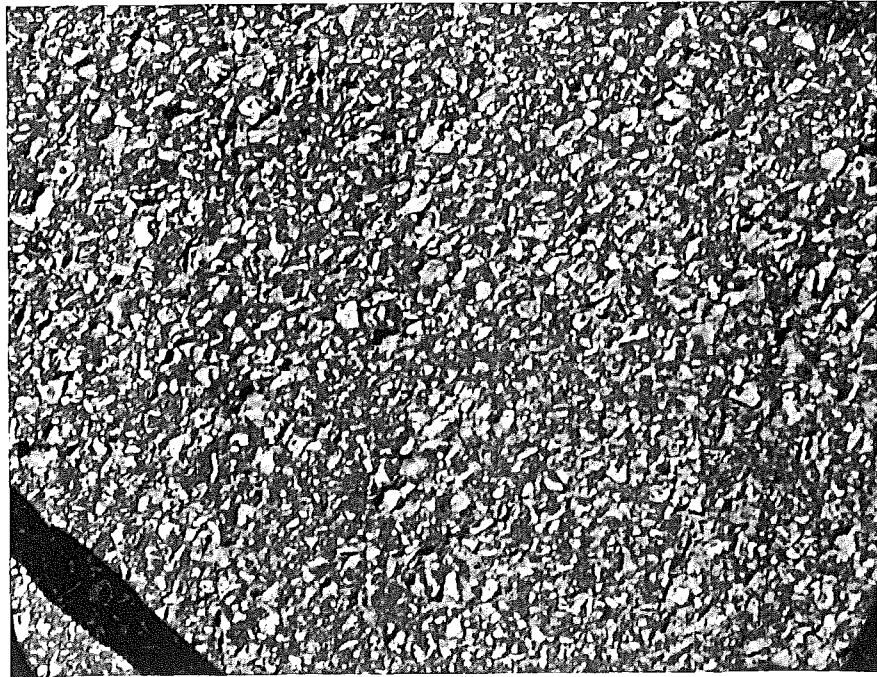
B. View showing typical condition of aggregate.

Lincoln Stone 26A Mod. U 13-51,C2 - 1947
M-96 West Mich. Ave., Battle Creek 6-18-52

Fig. 3

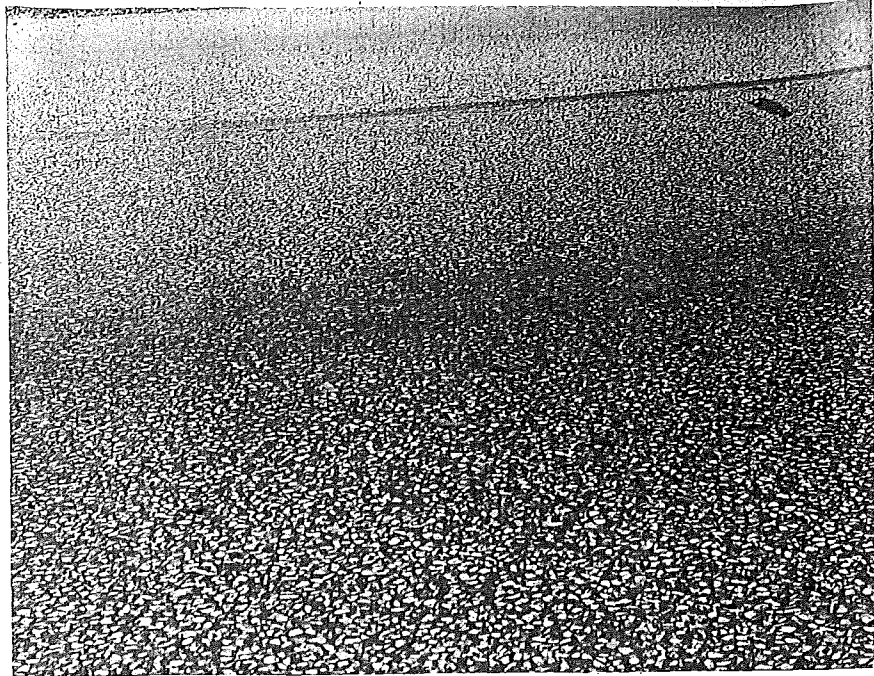


A. Typical condition of surface with medium pitting.

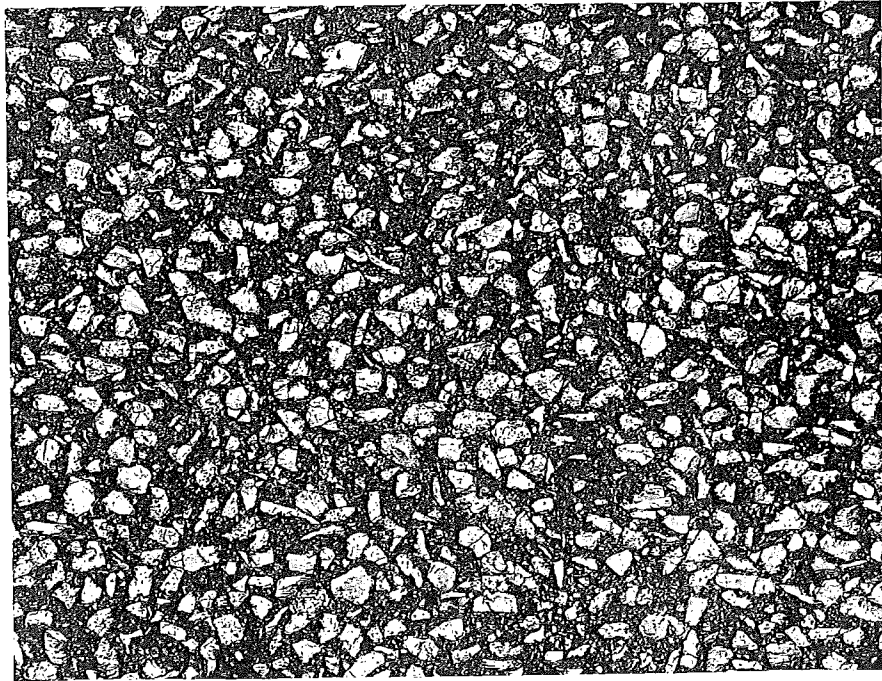


B. View of area showing pitting and condition of aggregate.

Lincoln Stone 26A Mod. M 8-17,C3 - 1948
M-37 from So. County Line North 6-18-52



A. Typical condition of surface. No pitting.

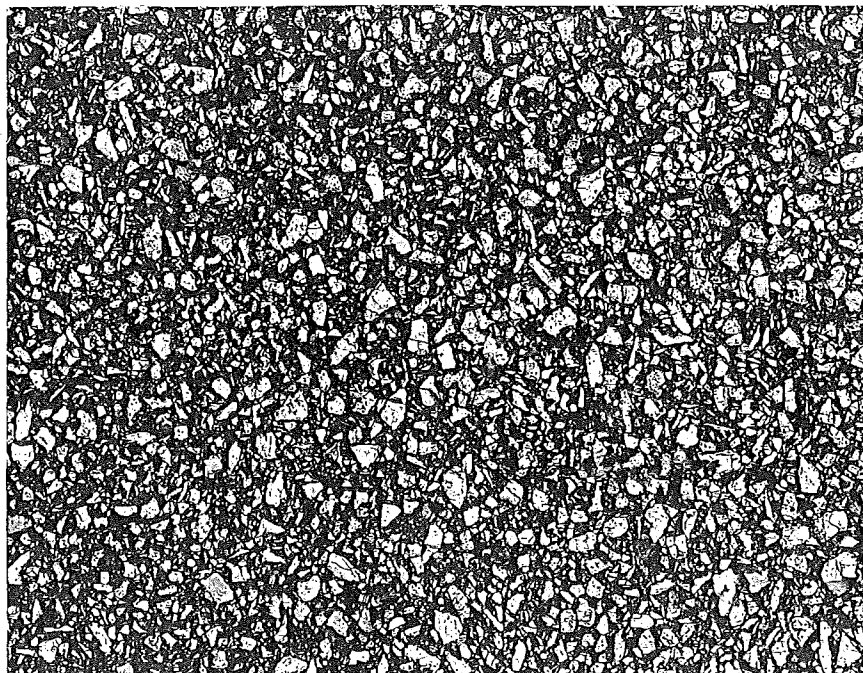


B. View of surface showing typical condition of aggregate.

Lincoln Stone 26A Mod. M 13-27, C14 - 1948
US-12 from Kalamazoo Co. line East 6-19-52



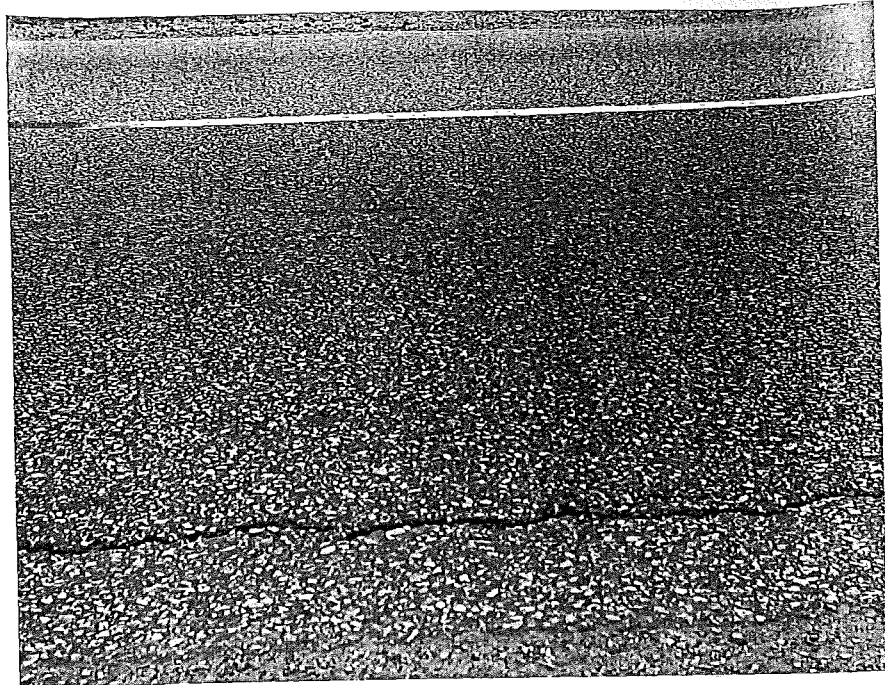
A. Typical condition of surface. No pitting.



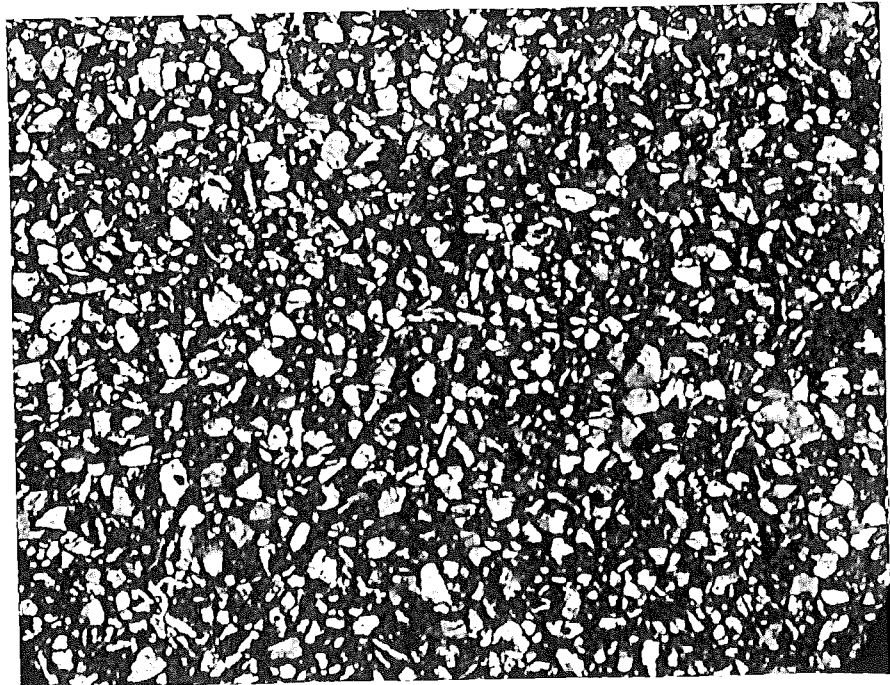
B. View of area showing typical condition of aggregate.

Lincoln Stone 26A Mod. M 14-4,08 - 1948
M-60 South of Cassopolis 6-19-52

Fig. 7

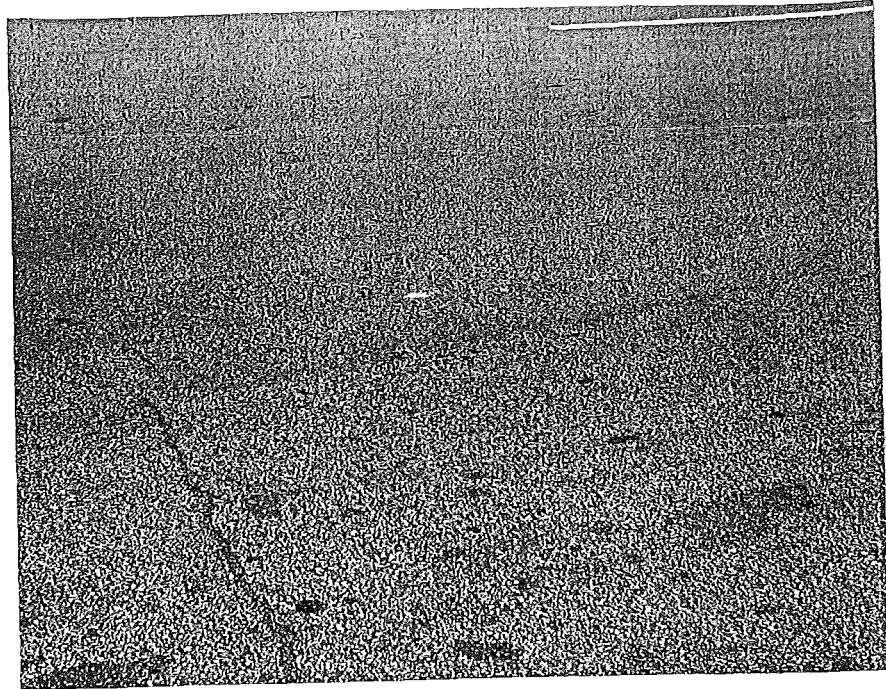


A. Typical condition of surface. No pitting.

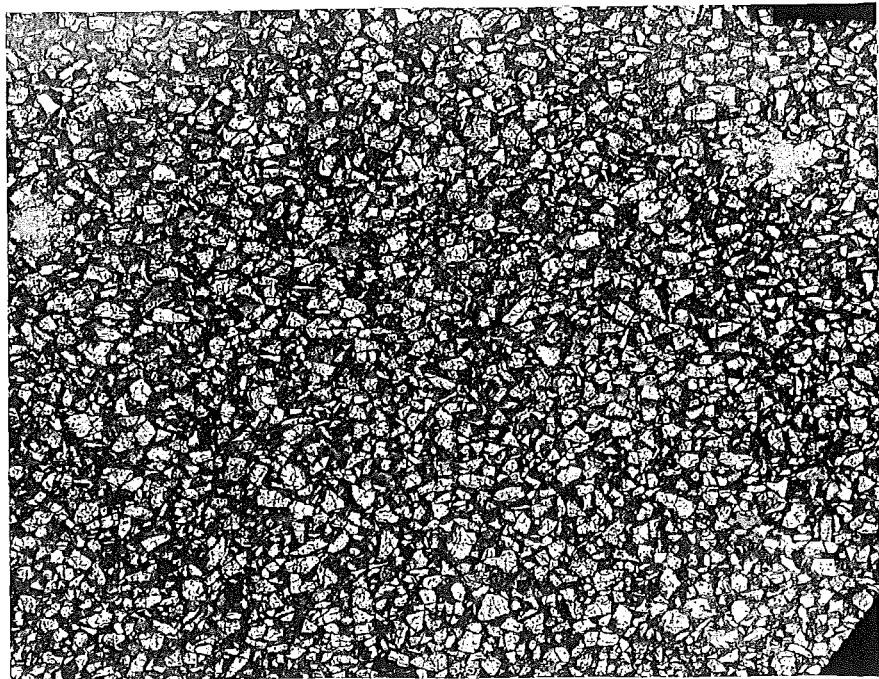


B. View of area showing condition of aggregate.

Lincoln Stone 26A Mod. M 14-15, C12 - 1948
US-112 east from Jct. M-119 6-20-52

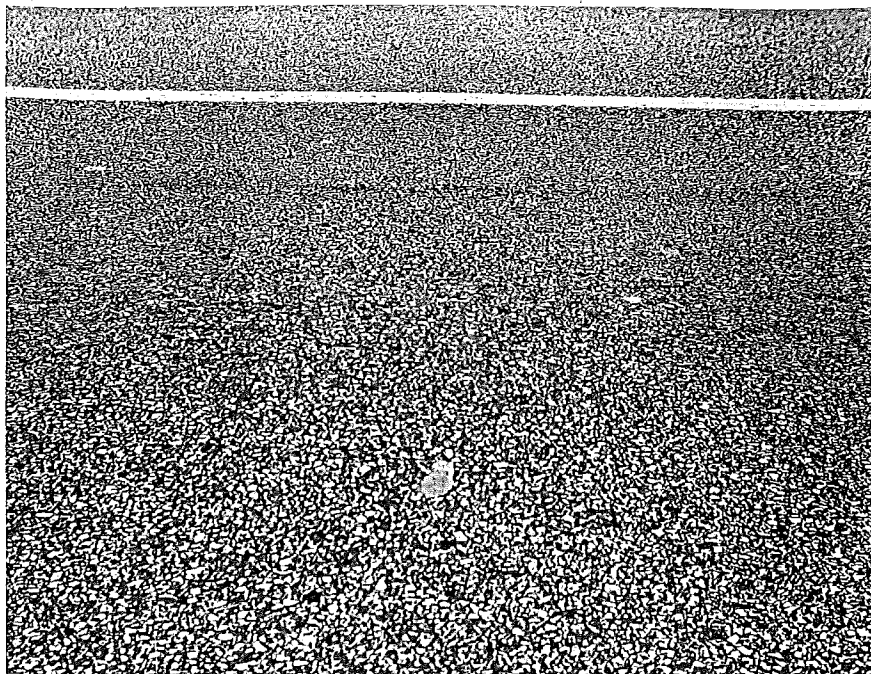


A. Condition of surface. No pitting.

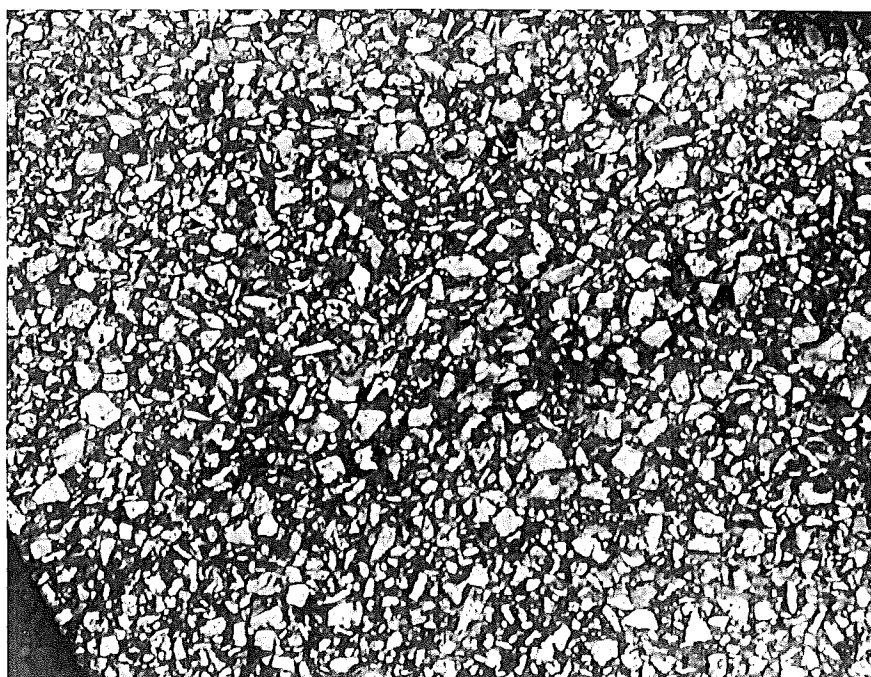


B. View showing condition of aggregate.

Lincoln Stone 26A Mod. M 39-30,C4 - 1948
US-12 in Kalamazoo near B1 of 39-7-2 6-19-52

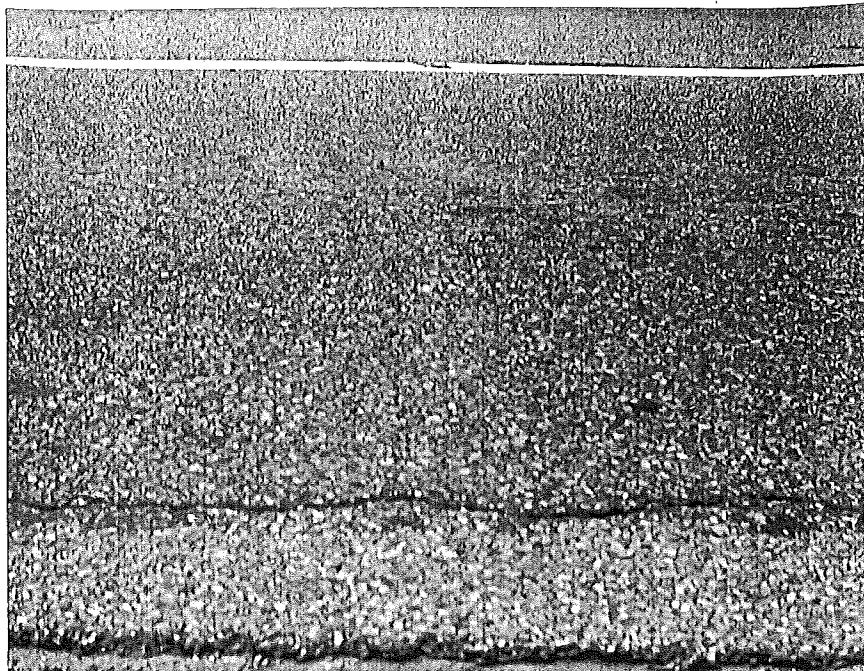


A. Condition of surface. Slight pitting.

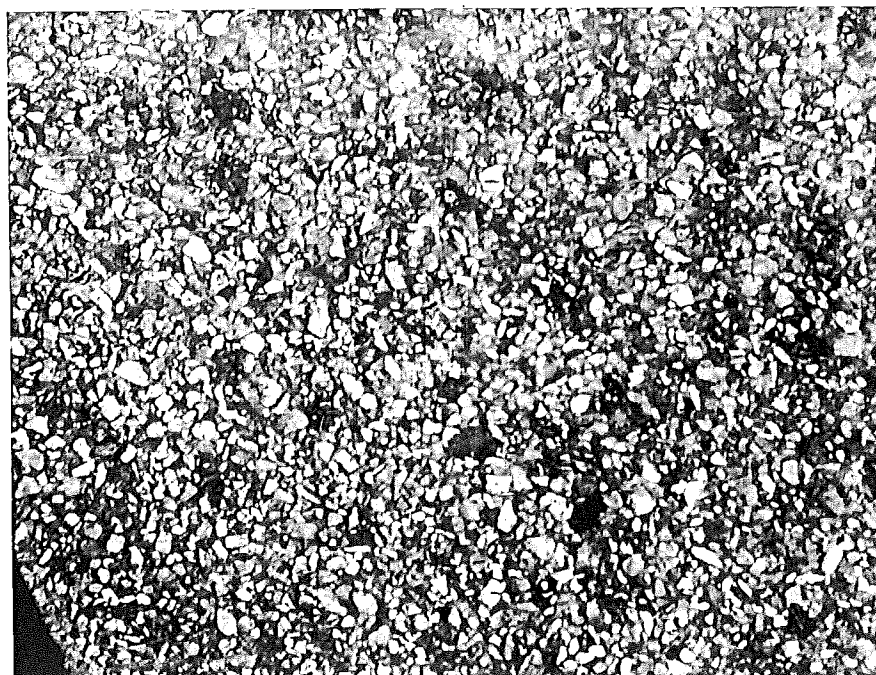


B. View showing character of surface and condition of aggregate.

Lincoln Stone 26A Mod. M 78-2,C6 - 1948
US-131 in Village of Constantine
on Canaris St. 6-20-52

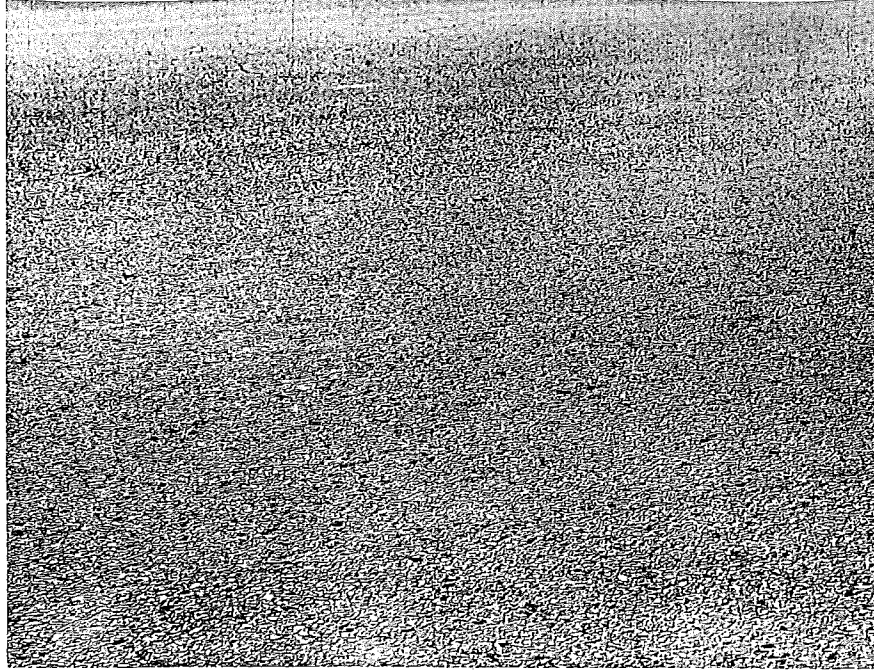


A. Condition of surface showing very slight pitting.

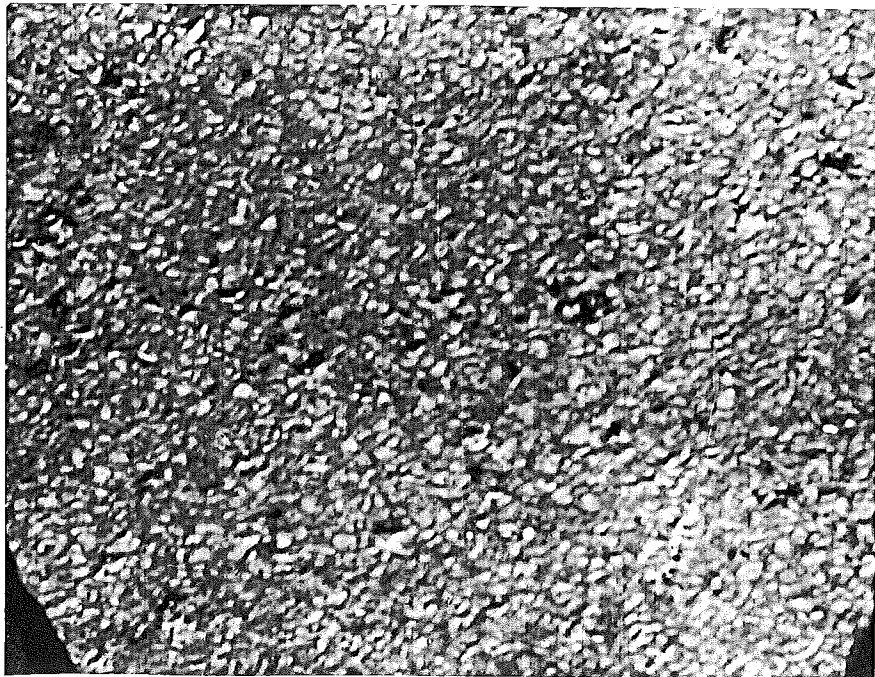


B. View showing texture of surface and aggregates.

Lincoln Stone 26A Mod. M 78-14,06 - 1948
US-112 Mottville to White Pigeon 6-20-52

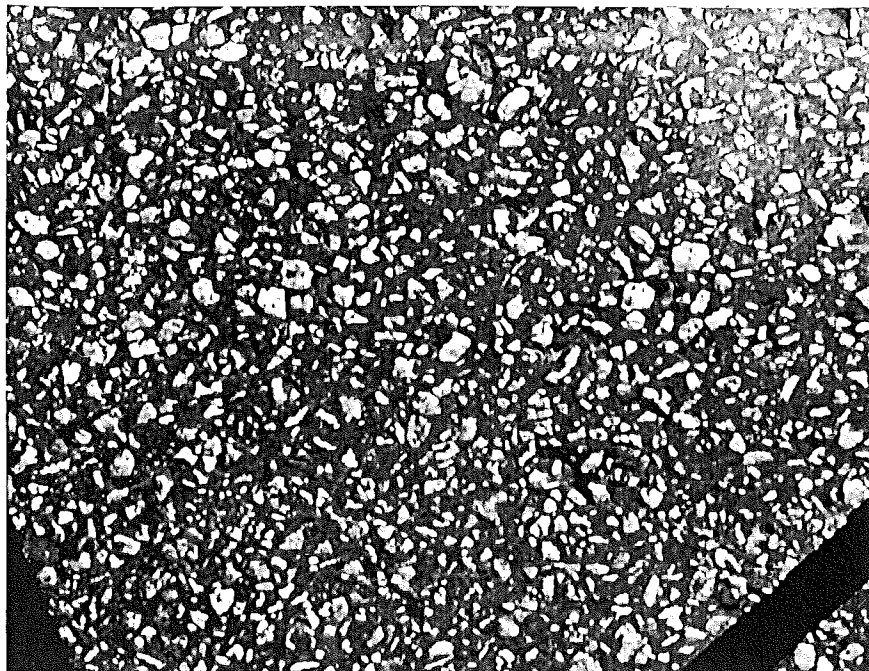


A. Condition of surface. Heavy pitting.

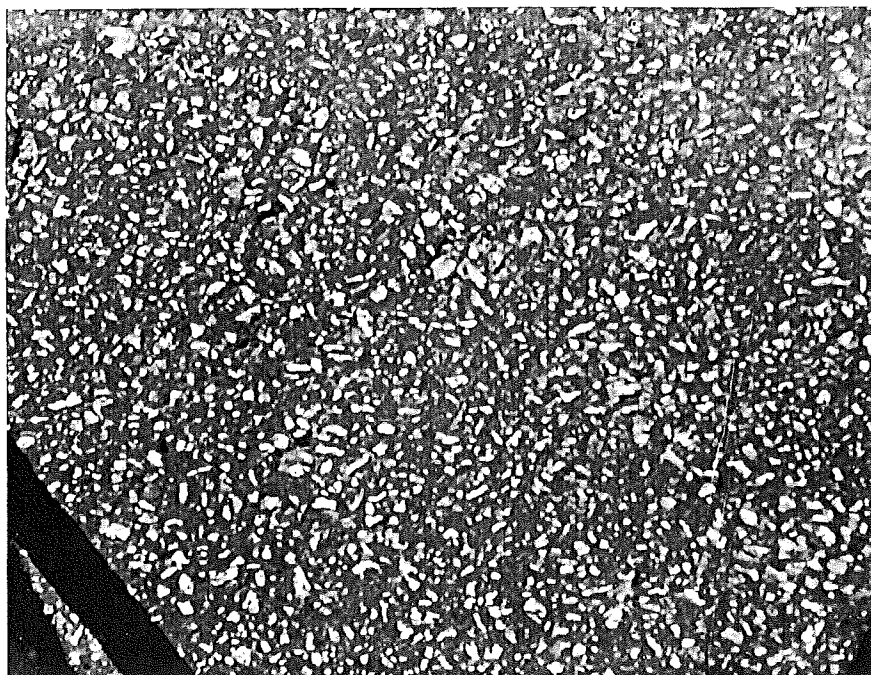


B. View showing character of surface and pitting.

Lincoln Stone 26A Mod. M 8-32,C2 - 1949
M-66 in Nashville, North of R.R. Tracks 6-18-52



A. View of area showing slight pitting; circle in Marshall.



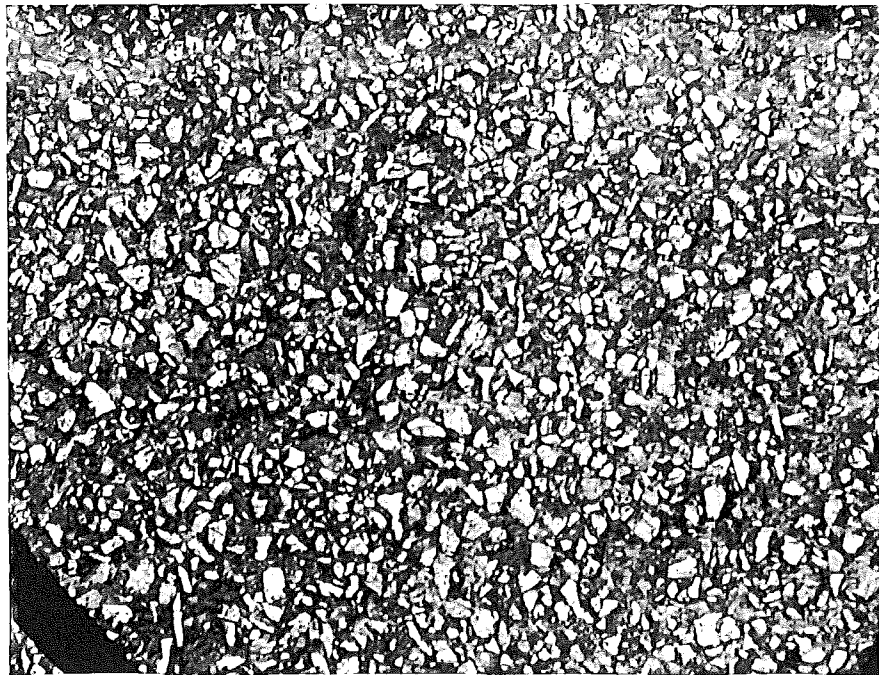
B. View showing character of surface.

Lincoln Stone 25A. 13-6,C2
US-127 So. edge of Marshall

- 1950
6-18-52



A. General view showing close texture. No pitting.

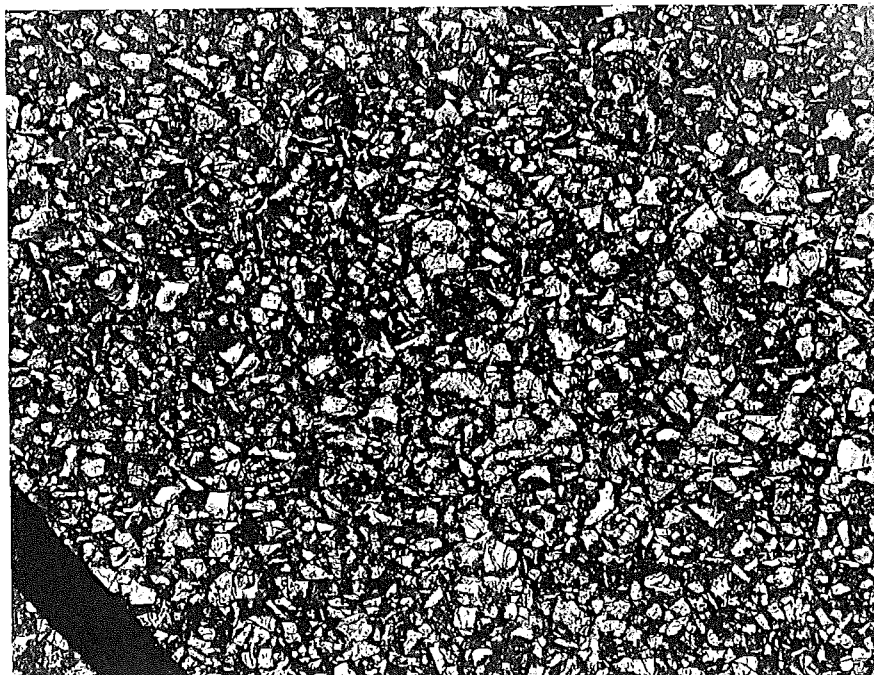


B. View showing texture of surface.

Lincoln Stone 25A Mod. 13-58, Cl - 1950
US-12 & M-96 Battle Creek 6-18-52



A. Condition of surface. Slight pitting.

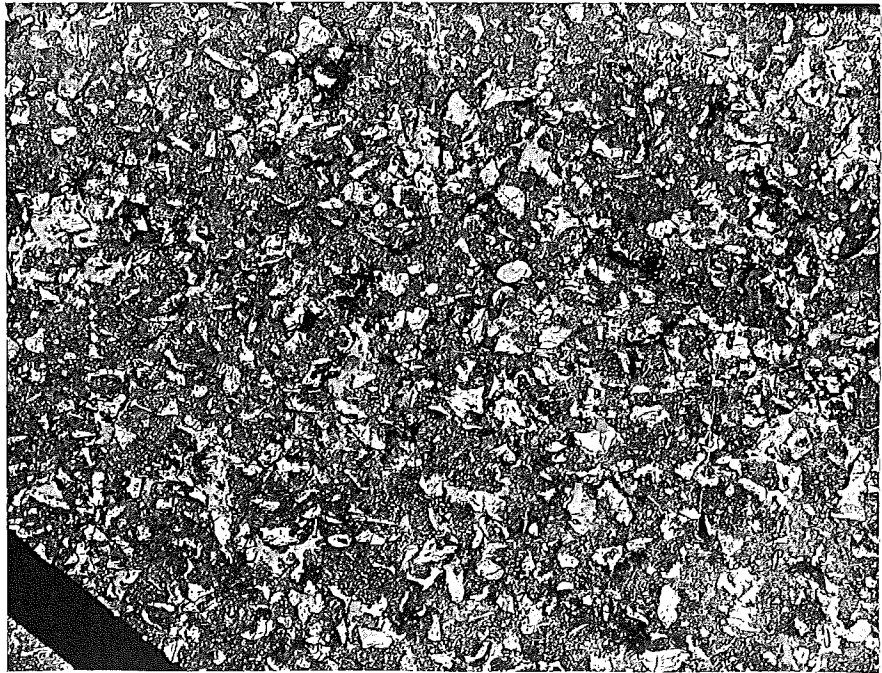


B. View showing typical condition of surface.

Lincoln Stone 25A. M 13-9,C3 - 1950
On M-78 leg of Jct. with M-66 6-19-52



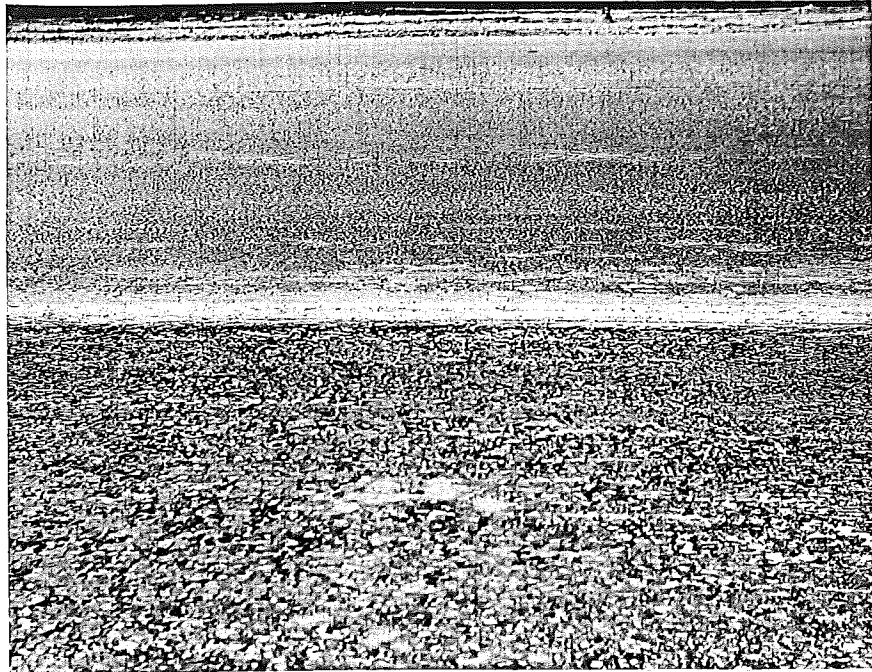
A. Condition of surface showing slight pitting.



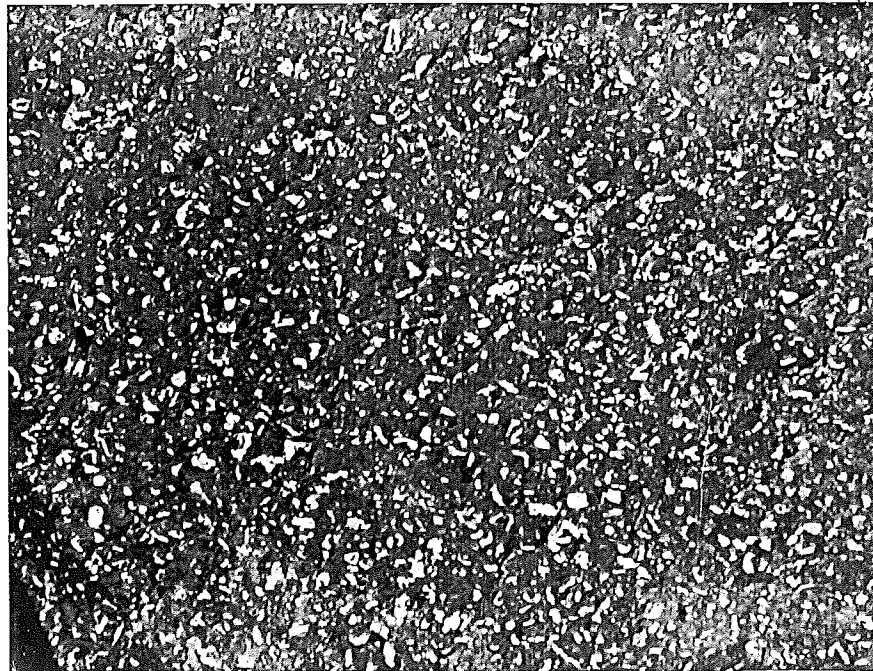
B. View showing typical condition of surface.

Lincoln Stone 25A SS 80-20,04 - 1950
On M-94 in Paw Paw 6-19-52

Fig. 17



A. Typical condition showing open texture. No pitting.



B. View showing character of surface.

Monon Stone 25A Mod. M 78-11, C4 - 1951 Constr.
M-60 east of Three Rivers toward
Mendon

6-20-52