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# **SURVEY of BITUMINOUS MIXING PLANT and PAVING EQUIPMENT**



**MAY 1958**

**MICHIGAN  
STATE HIGHWAY DEPARTMENT**

**JOHN C. MACKIE  
COMMISSIONER**

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SURVEY OF  
BITUMINOUS MIXING PLANT  
AND PAVING EQUIPMENT

Testing Laboratory, University of Michigan  
Ann Arbor

Office of Testing and Research  
Lansing

Michigan State Highway Department  
John C. Mackie, Commissioner  
Lansing, May 1958

## SURVEY OF ASPHALT PLANT AND PAVING EQUIPMENT

This report has been compiled at the request of Mr. W. W. McLaughlin, Testing and Research Engineer, and is for the purpose of assisting the State Highway Industry Committee to study and advise the Department on various problems in the bituminous construction field. The aim of the enclosed tabulations is to present an up-to-date inventory of the various plant and paving equipment which was assembled from past and recent inspections made of the bituminous mixing plants currently available for state highway construction.

The Testing and Research Division has endeavored to maintain as complete an inventory as possible of the contractor's equipment for bituminous paving operations in order that such information would be available for use of inspection personnel at the time of construction and also for consideration in developing policies for both specification and quality control. Tabulations of the plant inventory have been compiled for the years of 1952, 1954, 1956, and the current one - 1958.

This inventory, which started primarily as a Testing and Research function, has been supplemented with assistance from the Construction Division personnel in recent years. Because of the short time available this year to prepare this report, additional assistance had to be obtained from the Construction Office and the use of several of the more experienced asphalt plant inspectors of their Division was obtained to survey

the field equipment installations to correct the inventory for changes which had been accomplished in the last year. Insofar as possible, every effort has been made to make this inventory as accurate as could be obtained with visual inspection and measurements, etc. In the majority of cases the plants had not commenced operation for the year making it impossible to obtain certain items for this inventory.

The tabulations consist of three tables in which the inventory data is given. Four additional tables have been added to the report to summarize various items in the detailed tabulation. Further, the Testing and Research Division has each year, at the end of the construction season, computed the production rates of each plant on each job under contract during the year, to determine the average hourly production in tons of the various types of mixtures on each job. An illustration of this tabulation is given in Appendix A which contains the data from construction jobs done in 1957. The data tabulated is obtained by totaling up the actual hours of plant operation on each type of mix and dividing it into the total tons of this type of mix produced by each plant on each project.

#### DETAILS REGARDING TABULATED DATA

Table 1 includes all of the plant data for batch type asphalt mixing plants. Table 2 presents similar data for the continuous type asphalt mixing plants. It must be pointed out that while all of the batch type plants meet the specifications required for Class I bituminous concrete

mixes, several of the continuous type mixing plants are not fully equipped for this type of mixture. The continuous type mixing plants not meeting the specification requirements for 4.12 bituminous concrete mixtures are permitted to be used on specification 4.09 or 4.11 bituminous aggregate mixtures.

There has been a continual growth in the number of asphalt mixing plants available for State Highway construction. In reviewing past tabulations we find that in 1952 there were a total of 46 asphalt mixing plants, four of which were the continuous type. By 1954 this had increased to 55 plants, eight of which were of the continuous type. In 1956 the number of plants had increased to 70, twelve of which were of the continuous mixing type of plant. The present tabulation in Table 1 and 2 indicates that there are now 85 plants in use for State Highway construction in Michigan, eighteen of them being the continuous type plants. The following specific items have been extracted from Tables 1 and 2 and summarized for review, as they represent pertinent points with respect to inspection control and specifications.

1. Twenty-nine asphalt mixing plants have automatic controls of various types on the dryer burners for regulation of the aggregate temperature.
2. Eight of the batch type asphalt mixing plants are equipped to automatically weigh the aggregates and asphalt into the pugmill.

3. Twenty-seven of the batch type asphalt plants are equipped with automatic timers to program the dry and wet mixing time to the specified limits.

4. Seven of the batch type mixing plants are equipped with the fluidometer asphalt meter for automatically measuring by volume the specified weight of asphalt into each batch. These are presently used on trial basis and will be evaluated before approval is given for their continued use.

5. Twelve of the asphalt mixing plants are equipped with sand blending bins on the cold feed to permit automatic blending of coarse and fine sand to meet the bin specification gradation requirements.

In Table 3 are tabulated the various items of paving equipment owned by each contractor. This has been tabulated separately, as it is the practice of the contractors to transfer their equipment around between their several plants as required by the various construction jobs they are operating on. Therefore, there is no assurance that a particular item of equipment will be with any individual asphalt mixing plant, and it was deemed preferable to make this tabulation separately by contractor, rather than including these items with the asphalt mixing plant data.

Table 4 is a tabulation of the various sizes and number of asphalt mixing plants of which the Division has record from the 1952, 1954, 1956,

and 1958 inventories. The tabulation has been broken down according to the rated capacity of the pugmill on the batch plants. The continuous plants have been included in the table in the approximate order of their productive capacity, it being impracticable to rate the pugmill capacity for this type of plant. Including the continuous plants in this manner may have resulted in some under-estimation in their capacity, and may be subject to some criticism particularly with the larger size continuous type equipment.

Since hot aggregate bin capacity is a specific requirement of the specifications for the various types of bituminous mixtures, a summary tabulation has been made in Table 5 of these capacities on the basis of the 1958 survey of the plant equipment. Data from the previous survey years has been included to furnish the basis for comparison of these hot aggregate bin capacities. The table has been computed on the basis of the bin capacity in tons per ton of rated pugmill capacity, and the bin capacities for each size of pugmill tabulated separately. To illustrate this tabulation, under the column headed by the 4,000 lb. or 2 ton rated pugmill capacity in 1958, it is found that the hot bin capacities ranged from 15 to 75 tons of hot aggregate storage per ton of rated pugmill capacity with an average of 27.3 tons per ton of rated pugmill capacity. The actual size of bins on the 4,000 lb. plants in 1958 would, therefore, be 30 to 150 tons with an average of 54.6 tons of storage capacity for the two-ton plants.

The 1950 specifications had a minimum requirement for the volume of the dryer, this being 432 cubic feet for a 2,000 lb. pugmill. From the data in the tabulation for 1958, the actual dryer volume has been computed for each plant and an average volume determined for comparison with the rated pugmill capacity on each plant. Further computation has been made to determine the dryer volume, both minimum and average in cubic feet for each ton of rated pugmill capacity on these various size plants.

As noted previously in Appendix A, there is tabulated the survey made on the basis of 1957 projects on the production rates of bituminous mixture from contractors operating during that period. These production rate surveys have been made since 1952. In Table 7 the data has been summarized from the previous years for comparison with the 1957 production rates in Appendix A for bituminous concrete wearing course only. These production rates have been computed on the basis of tons per hour per ton of pugmill capacity and separated according to the various size pugmills with which the plants are equipped. Both the minimum and maximum rates are also included with the average rate in tons per hour per ton of pugmill capacity. The lower portion of Table 7 contains the actual production rate of the various size plants in tons per hour. The tabulated productions are presented merely to show trend as it must be realized that there are other things that control the production rates besides the actual pugmill size.



The raw data sheets from which this report was prepared are on file at the Laboratory for further review and evaluation. Following previous policy, periodic inspections will be made on all plants while they are in operation on actual construction to make corrections and additions to the inventory data.



TABLE 3  
BITUMINOUS PAVING EQUIPMENT

No.	Contractor	Home Office Address	No. Asphalt Batch Plant	Distributor	Spreader	Rollers	Trencher	Trench Rollers	Curb Machines
			Cap. Gal.	Model	No.	Model	No.	Model	No.
1	A. & A. Asphalt Paving Co.	1015 Haynes Birmingham, Mich.	2	1 Littleford 1300	2 BG 1300	2 Gallions 10-12			1 Stevens-Garfield
3	Ann Arbor Const. Co.	203 Park St. Ann Arbor, Mich.	4	1 Duquesne 1300 Littleford 2000 Littleford 2000 Littleford	2 BG 1300 2 BG 2000 2 BG 2000	2 Gallions 8-10 2 Buffalos 8-10 2 Gallions 8-10	1 Allis Chalmers	1 Buffalo	1 Ebyre Stevens-Garfield
7	Ayling Asphalt Paving Co.	306 College Ave. Detroit 21, Mich.	1	1 Ebyre 800	1 BG 800	1 Gallions 8-12	1 Grader blade att.		1 Stevens-Garfield
8	Cadillac Asphalt Paving Co.	1040 W. Warren Detroit 21, Mich.	3	1 Ebyre 1200	1 BG 1200	1 Gallions 8-10	1 Back hoe		
10	Central Paving Co.	PO Box 312 West Branch, Mich.	1	1 Gausse 1000	1 BG 1000	1 Gallions 8-10	1 Dumore	1 Buffalo	
11	Cooke Const. Co.	1116 Fremont Blvd. Detroit 26, Mich.	4	2 Racore 1300	2 BG 1300	2 Buffalos 10		2 Buffalo	1 Stevens-Garfield
15	Detroit Asphalt Paving Co.	5700 E. Nevada Detroit 34, Mich.	5	2 Racore 1500	2 BG 1500	2 Buffalos 8-12			
20	Detroit Concrete Products	17309 W. Davison St. Detroit, Mich.	2	1 Ebyre 1000	1 BG 1000	1 Gallions 8-10			
22	East Shore Asphalt Paving Co.	PO Box 31 Alpena, Mich.	1	1 Racore 1000	1 BG 1000	1 Gallions 8-12			1 Stevens-Garfield
23	Faint Asphalt Paving Co.	612 W. 12th St. Flint, Mich.	1	1 South Bend 1000	1 BG 1000	1 Gallions 8-12			
24	Fox Valley Const. Co.	PO Box 827 Appleton, Wis.	1	1 Gummison 1000	1 BG 1000	1 Gallions 8-10	1 Grader - Att.	1 Buffalo	
24	Garavaglia, Louis	2000 W. Main St. Marquette, Mich.	1	1 Racore 1000	1 BG 1000	1 Gallions 8-12	1 Cleveland		
25	Globe Const. Co.	312 Park Hlge.	3	2 Littleford 1000 Littleford 600 South Bend 200	1 BG 1000 1 BG 600 2 BG 200	2 Gallions 8-12 2 Buffalos 8-12 2 Buffalos 8-12	1 Grader - Att.	1 Buffalo	1 Stevens-Garfield
28	Groven Asphalt Paving Co.	6800 11 Mile Rd. Cantonius, Mich.	1	1 Ebyre 1000	1 BG 1000	1 Gallions 8-12	1 Grader - Att.		
29	Co. Rapids Asphalt Paving Co.	311 Mackes Ave. SW Grand Rapids, Mich.	1	1 Ebyre 1000	1 BG 1000	1 Gallions 8-12			
30	Has Hulse Co.	PO Box 311 Adam, Mich.	1	1 Littleford 1000	1 BG 1000	1 Gallions 8-12			1 Stevens-Garfield
31	Hedgick & Duma	PO Box 311 Hartsville, Mich.	2	2 Racore 1000	2 BG 1000	2 Gallions 8-12	1 Douglas & Duma	1 Gallion	
33	Klett Const. Co.	Route #3 Howell, Mich.	2	2 Racore 1000	2 BG 1000	2 Gallions 8-12	1 Grader - Att.		
34	Lake Const. Co. Inc. & Howell Const. Co. Inc.	PO Box 311 Howell, Mich.	1	1 Racore 1000	1 BG 1000	1 Gallions 8-12			
35	Larmer, M. T. & Co.	PO Box 311 Michigan Colaprovica Co.	1	1 South Bend 1000	1 BG 1000	1 Gallions 8-12			1 Stevens-Garfield
36	Michigan Colaprovica Co.	2020 Chicago Drive Grand Rapids, Mich.	2	1 South Bend 900	2 BG 900	2 Gallions 8-10			1 Stevens-Garfield
38	Mid-America Eng. Co.	1812 Dempster, PO Box 108 Stock, Ill.	3	1 Ebyre 1300	1 BG 1300	1 Gallions 8-12	1 Dumore	2 Gallions	1 Ebyre Wall
41	Midland Const. Co.	145 Bond St. PO Box 387 10348 Sycamore Ave. Saginaw, Mich.	2	1 Gummison 1000	2 BG 1000	2 Gallions 8-12		1 Gallion	1 Ebyre
43	Miller, Paul O.	10348 Sycamore Ave. Saginaw, Mich.	1	1 Gummison 1000	1 BG 1000	1 Gallions 8-12			
44	Mustegan Asphalt Paving Co.	1000 E. Sherman Mustegan, Mich.	1	1 South Bend 1100	1 BG 1100	1 Gallions 8-12		1 Gallion	
47	Northern Asphalt Paving Co.	805 Washington St. Escanaba, Mich.	1	1 Racore 1000	1 BG 1000	1 Gallions 8-10			
45	Payne & Dolan	725 N. Water St. Milwaukee, Wis.	1	1 Gummison 1000	1 BG 1000	1 Gallions 8-12	1 Grader - Att.	1 Gallion Buffalo	1 Curber
46	Peckas Asphalt Paving Co.	12119 Ryan Rd. PO 185, Mich.	1	1 Ebyre 1000	1 BG 1000	1 Gallions 8-12	1 Combination		1 Stevens-Garfield
48	Reith-Kiley Const. Co. Inc.	Traverse City, Mich.	3	1 Ebyre 2000	1 BG 2000	1 Gallions 8-12			
51	Robinson Asphalt, Inc.	3000 Arvidson Rd. Grand Rapids, Mich.	1	1 Littleford 1500	1 BG 1500	1 Gallions 8-10	1 Dumore	3 Gallions	1 Ebyre
56	Stevens Asphalt Paving Co. (Sargent Const. Co.)	S. Cedar St. Holt, Mich.	2	1 Littleford 1300	2 BG 1300	2 Gallions 8-10	1 Dumore Austir-Western		1 Stevens-Garfield
53	Sparvan Asphalt Co.	243 Wilking Saginaw, Mich.	1	1 South Bend 1000	1 BG 1000	1 Gallions 8-10			
55	Tharnton Const. Co.	1018 Rebel Ave. Hancock, Mich.	3	1 Racore 1000	1 BG 1000	1 Gallions 8-12	1 Grader - Att.	1 Huber	
58	Ward & Van Nuck	1694 E. Nevada Detroit 21, Mich.	1	2 Chausse 1000	1 BG 1000	1 Gallions 10-12			1 Stevens-Garfield
59	West Shore Const.	Zealand, Mich.	1	1 Secrum-Gummison 2500	3 BG 2500	3 Gallions 8-10	1 Dumore		1 Yes
61	Williams Bros.	PO Box #78 Jonia, Mich.	1	1 South Bend 1500	2 BG 1500	2 Gallions 8-10	1 Grader - Att.	1 Ball Pack	
60	Workman, H. L.	661 Lewis St. Jackson, Mich.	1	1 Littleford 1300	3 BG 1300	3 Gallions 8-12	1 Austin-H, grader	1 Gallion	1 Stevens-Garfield
61	Wright Const. Co.	PO Box 5271, Wood St. Lansing, Mich.	1	1 Littleford 1050	1 BG 1050	1 Gallions 8-10	1 Dumore	1 Gallion	1 Stevens-Garfield
65	Yarrigson, John O.	Route #3, Box #31 Berton Harbor, Mich.	3	1 Littleford 1250	1 BG 1250	1 Gallions 10	1 Grader - Att.	1 Gallion	1 Ebyre

TABLE 4

BITUMINOUS PLANT INVENTORY  
(By Years)

Rated Capacity	Number of Plants							
	1952		1954		1956		1958	
	Batch	Cont.	Batch	Cont.	Batch	Cont.	Batch	Cont.
2000 lbs. B.G. #842 & #845	11	1	8	2	9	1	13	1
3000 lbs. B.G. #847	10	-	8	-	11	-	12	1
4000 lbs. B.G. #848 Pioneer #51	18	2 1	26	5 1	27	10 1	28	15 1
5000 lbs.	3		5		10		11	
6000 lbs.	-		-		1		2	
8000 lbs.	-		-		-		1	
Subtotal	42	4	47	8	58	12	67	18
Total Plants	46		55		70		85	

TABLE 5

## HOT AGGREGATE BIN CAPACITIES

TONS OF HOT AGGREGATE STORAGE PER TON RATED PUGMILL CAPACITY

Pugmill Capacity	lbs.	2000			3000			4000			5000			6000		
	tons	1			1.5			2			2.5			3		
Year	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.	
1952	13	30	21.7	10	30	15.3	9	40	22.4	16	16	16	-	-	-	
1954	13	30	24.4	10	30	17.4	12	40	22.2	10	34	22.0	-	-	-	
1956	10	30	22.2	10	30	17.0	12	40	22.0	16	34	23.5	-	-	-	
1958	10	50	26.9	10	33	21.2	15	75	27.3	16	33	25.6	16	20	18	

TABLE 6

DRIER CAPACITIES  
USED WITH  
VARIOUS SIZES OF PUGMILL MIXERS  
(1958)

Pugmill Capacity (lbs.)	Drier Volume (cu. ft.)			Drier Volume (cu. ft.) per one ton pugmill		
	Min.	Max.	Ave.	Min.	Max.	Ave.
2000	382	707	504	382	707	504
3000	410	1078	800	273	719	533
4000	550	1272	821	275	636	410
5000	736	1659	1157	294	664	463
6000	1091	2011	1551	364	670	517
8000	-	-	1520	-	-	380

TABLE 7

BITUMINOUS MIX PRODUCTION RATES  
FOR BITUMINOUS CONCRETE WEARING COURSE (4. 12)  
(1952 - 1957)

	Mixing Capacity (lbs.)	1952			1953			1954			1955			1956			1957		
		Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.
Rate of output per ton of pugmill capacity (tons per hour)	2000 - 2500	29	46	37	26	50	37	30	34	32	33	34	34	22	37	30	31	42	37
	3000	28	45	38	21	43	36	25	44	32	28	45	37	30	49	38	29	46	38
	3750 - 4000	24	41	31	25	38	32	19	42	30	13	39	30	18	48	33	14	45	31
	5000	24	24	24	26	42	33	23	24	24	25	30	28	24	47	31	26	39	32
	6000	-	-	-	-	-	-	-	-	-	-	-	-	26	31	29	38	39	39
Rate of output for each size plant classification (tons per hour)	2000 - 2500	32	57	42.6	31.9	49.5	41.2	36.4	43	39.7	39.8	42.0	40.9	27.0	44.8	33.0	36.9	50.6	42.7
	3000	42	68	57.0	31.0	69.1	54.9	36.8	65.4	48.1	42.5	67.2	55.4	45.4	69.0	56.9	43.0	69.1	56.1
	3750 - 4000	45.5	81.0	59.2	46.5	71.7	61.8	38.2	79.2	57.5	26.7	73.9	57.4	33.4	95.9	63.6	27.3	84.2	58.4
	5000	60	61	61.5	65.5	106	82.1	57.7	61.2	59.2	41.9	75.1	63.4	62.0	118.5	78.7	66.1	96.3	78.7
	6000	-	-	-	-	-	-	-	-	-	-	-	-	77.6	93.7	85.7	113.5	117.6	115.5

## APPENDIX A

## SURVEY OF BITUMINOUS MIX PRODUCTION RATES - 1957

Contractor	Project	Location	Type	Manufacturer	Batch Weight	Tons/hour
Ann Arbor Construction Co. Ann Arbor	M 81061 C1-U	M 17	Bituminous Concrete Top	Combination	3750	60.9
Ann Arbor Construction Co. Kaleva	CS 5127 C3	FAS Route #467	Bituminous Aggregate 4/09	Combination	5335	98.8
Ann Arbor Construction Co. Ortonville	F 63071 C1-R	M 15	Bituminous Concrete Binder	Combination	5000	82.5
Ann Arbor Construction Co. Ortonville	F 63071 C1-R	M 15	Bituminous Concrete Top	Combination	5000	78.3
Ann Arbor Construction Co. Ypsilanti	CS 81-94 C1 CS 81-92 C1	FAS #588	Bituminous Aggregate 4.09	Combination	3750	78.5
Ayling Asphalt Paving Co. Reed City	M 67014 C1-R	M 131	Bituminous Concrete Binder	Cummer	3750	80.3
Ayling Asphalt Paving Co. Reed City	M 67014 C1-R	M 131	Bituminous Concrete Top	Cummer	3750	49.5
Cooke Contracting Co. Centerline	F 50012 C1-U	M 53	Bituminous Concrete Leveling	Cummer	4000	76.1
Cooke Contracting Co. Centerline	F 50012 C1-U	M 53	Bituminous Concrete Top	Cummer	4000	63.5
Cooke Contracting Co. Smiths Creek	CS 7786 C1 CS 7787 C1	County Rd. Broadbridge Rd.	Bituminous Concrete Binder	Cummer	2500	37.7
Cooke Contracting Co. Smiths Creek	CS 7786 C1 CS 7787 C1	County Rd. Broadbridge Rd.	Bituminous Concrete Top	Cummer	2500	46.2
Cooke Contracting Co. Wayne	I 82022 C2	US 112 Expressway	Bituminous Concrete Binder	Barber-Greene	4000	89.2
Cooke Contracting Co. Wayne	I 82022 C2	US 112 Expressway	Bituminous Concrete Top	Barber-Greene	4000	65.0
Detroit Asphalt Paving Co. Green Oaks	CS 47041 C2	Kensington	Bituminous Concrete Binder	Combination	3600	61.5
Detroit Asphalt Paving Co. Green Oaks	CS 47041 C2	Kensington	Bituminous Concrete Top	Combination	3600	52.0
Detroit Asphalt Paving Co. Inkster	M 82211 C6R	US 25	Bituminous Concrete Binder	H & B	5000	77.5
Detroit Asphalt Paving Co. Inkster	M 82211 C6R	US 25	Bituminous Concrete Top	H & B	5000	69.3
Detroit Asphalt Paving Co. Monroe	M 58071 C1-U	US 25	Bituminous Concrete Binder	Combination	5000	71.9
Detroit Asphalt Paving Co. Monroe	M 58071 C1-U	US 25	Bituminous Concrete Top	Combination	5000	66.1
Detroit Concrete Products New Hudson	M 47064 C1-RN	US 16	Bituminous Concrete Binder	Hetherington Bernier	2000	44.0
Detroit Concrete Products New Hudson	M 47064 C1-RN	US 16	Bituminous Concrete Top	Hetherington Bernier	2000	41.3
Eastshore Asphalt Paving Manistique	M 75011 C2-R	M 149	Bituminous Aggregate 4.11	Hetherington Bernier	3750	68.5
Fox Valley Construction Co. Loretto	M 22023 C2-R	US 2	Bituminous Concrete Binder	Barber-Greene	Continuous #848	49.5
Fox Valley Construction Co. Loretto	M 22023 C2-R	US 2	Bituminous Concrete Leveling	Barber-Greene	Continuous #848	78.8
Fox Valley Construction Co. Loretto	M 22023 C2-R	US 2	Bituminous Concrete Top	Barber-Greene	Continuous #848	62.4
General Paving Co. M 55 East of M 33	M 65022 C2-R	M 55	Bituminous Aggregate 4.11	Standard	3750	78.0
General Paving Co. Greenville	M 34011 C2-R	M 91	Bituminous Concrete Binder	Standard	3750	39.2



## APPENDIX A Continued

Contractor	Project	Location	Type	Manufacturer	Batch Weight	Tons/hour
General Paving Co. Greenville	M 34011 C2-R	M 91	Bituminous Concrete Leveling	Standard	3750	60.0
General Paving Co. Greenville	M 34011 C2-R	M 91	Bituminous Concrete Top	Standard	3750	46.6
Globe Construction Co. Jackson	M 38051 C1-R M 33091 C1-U	M 106 M 92	Bituminous Concrete Leveling	H & B	3000	64.5
Globe Construction Co. Jackson	M 38051 C1-R M 33091 C1-U	M 106 M 92	Bituminous Concrete Top	H & B	3000	43.0
Globe Construction Co. Manistee	M 51021 C1-R	M 55	Bituminous Concrete Binder	Simplicity	2400	49.1
Globe Construction Co. Manistee	M 51021 C1-R	M 55	Bituminous Concrete Leveling	Simplicity	2400	49.6
Globe Construction Co. Manistee	M 51021 C1-R	M 55	Bituminous Concrete Top	Simplicity	2400	50.6
Gordon Asphalt Co. Centerline	M 82041 C1-R	M 17	Bituminous Concrete Leveling	Cummer	4000	35.6
Gordon Asphalt Co. Centerline	M 82041 C1-R	M 17	Bituminous Concrete Top	Cummer	4000	27.3
The Hicks Co. Suttons Bay	M 4541 C1-R	M 204	Bituminous Aggregate 4:1:1	Barber-Greene	Continuous #848	58.7
Hodgkiss & Douma East Jordan	M 15011 C1-R, etc.	US 31	Bituminous Concrete Leveling	Warren Bros.	2400	48.2
Hodgkiss & Douma East Jordan	M 15011 C1-R, etc.	US 31	Bituminous Concrete Top	Warren Bros.	2400	37.2
Hodgkiss & Douma Rogers City	F 71073 C1-R	US 23	Bituminous Concrete Leveling	Madsen	3000	85.5
Hodgkiss & Douma Rogers City	F 71073 C1-R	US 23	Bituminous Concrete Top	Madsen	3000	64.0
Lake & Howell Utica	CS 5063 C1	Utica Rd.	Bituminous Concrete Binder	Hetherington Berner	3000	72.6
Lake & Howell Utica	CS 5063 C1	Utica Rd.	Bituminous Concrete Top	Hetherington Berner	3000	61.4
M. T. Lardner Co. Port Huron	M 7711 C4	M 29	Bituminous Concrete Top	Cummer	2400	41.4
Mid-America Eng. Corp. M 57 & US 27	S 29022 C1-R M 29011 C1-RN	M 57	Bituminous Concrete Binder	H & B	3750	90.4
Mid-America Eng. Corp. M 57 & US-27	S 29022 C1-R M 29011 C1-RN	M 57	Bituminous Concrete Leveling	H & B	3750	79.2
Mid-America Eng. Corp. M 57 & US 27	S 29022 C1-R	M 57	Bituminous Concrete Top	H & B	3750	63.8
Mid-America Eng. Corp. Carlishend	F 52043 C1	US 41	Bituminous Concrete Binder	Barber-Greene	Continuous	62.1
Mid-America Eng. Corp. Carlishend	F 52043 C1-R	US 41	Bituminous Concrete Leveling	Barber-Greene	Continuous	65.4
Mid-America Eng. Corp. Carlishend	F 52043 C1-R	US 41	Bituminous Concrete Top	Barber-Greene	Continuous	61.2
Mid-America Eng. Corp. Muskegon	M 61031 C1-R	US 31	Bituminous Concrete Binder	Hetherington Berner	3750 5000	47.2
Mid-America Eng. Corp. Muskegon	M 61031 C1-R	US 31	Bituminous Concrete Top	Hetherington Berner	3750	55.7
Midland Contracting Co. Bay City	M 09041 C1-R F 09071 C1-R	M 20 M 15	Bituminous Concrete Binder	Cummer	3000	60.7

## APPENDIX A Continued

Contractor	Project	Location	Type	Manufacturer	Batch Weight	Tons/hour
Midland Contracting Co. Bay City	M 09041 C1-R	M 20	Bituminous Concrete	Cummer	3000	54.1
	F 09071 C1-R	M 15	Leveling			
Midland Contracting Co. Bay City	M 09041 C1-R	M 20	Bituminous Concrete	Cummer	3000	54.0
	F 09071 C1-R	M 15	Top			
Paul C. Miller Burnside	M 44032 C1-R	M 53	Bituminous Concrete	Madsen	3000	74.3
	M 74011 C1-R	M 53	Leveling			
Paul C. Miller Burnside	M 44032 C1-R	M 53	Bituminous Concrete	Madsen	3000	56.2
	M 74011 C1-R	M 53	Top			
Paul C. Miller Burnside	M 44061 C1-R	M 90	Bituminous Aggregate 4:11	Madsen	3000	71.0
Payne & Dolan, Inc. Beechwood	M 36021 C2-R	US 2	Bituminous Concrete Binder	Combination	3750	57.9
Payne & Dolan, Inc. Beechwood	M 36021 C2-R	US 2	Bituminous Concrete Leveling	Combination	3750	80.6
Payne & Dolan, Inc. Beechwood	M 36021 C2-R	US 2	Bituminous Concrete Top	Combination	3750	84.2
Payne & Dolan, Inc. Curtis	CS 49-49 C2	Route 335	Bituminous Aggregate 4:09	Barber-Greene	Continuous	150.6
Payne & Dolan, Inc. Silver City	S 66012 C1-R	M 64	Bituminous Aggregate 4:11	Barber-Greene	Continuous	93.0
Peake Asphalt Paving Co. Utica	M 50071 C2-U	M 29	Bituminous Concrete	Cedar Rapids	2000	51.8
	M 82144 C6-U	M 29	Leveling			
Peake Asphalt Paving Co. Utica	M 50071 C2-U	M 29	Bituminous Concrete	Cedar Rapids	2000	40.0
	M 82144 C6-U		Top			
Rieth-Riley Battle Creek	F 13032 C1-R	M 78	Bituminous Concrete Binder	Hetherington Berner	3750	93.0
Rieth-Riley Battle Creek	F 13032 C1-R	M 78	Bituminous Concrete Leveling	Hetherington Berner	3750	54.1
Rieth-Riley Battle Creek	F 13032 C1-R	M 78	Bituminous Concrete Top	Hetherington Berner	3750	62.3
Rieth-Riley Lake George	M18011 C1-R	M 115	Bituminous Concrete	Hetherington Berner	5000	72.1
	M67051 C1-R	M 115	Binder			
Rieth-Riley Lake George	M18011 C1-R	M 115	Bituminous Concrete	Hetherington Berner	5000	107.0
	M 67051 C1-R	M 115	Leveling			
Rieth-Riley Lake George	M 18011 C1-R	M 115	Bituminous Concrete	Hetherington Berner	5000	96.3
	M 67051 C1-R	M 115	Top			
Rieth-Riley Woodland	M 0812 C2-R	M 43	Bituminous Concrete Leveling	Hetherington Berner	5000	91.1
Rieth-Riley Woodland	M 0812 C2-R	M 43	Bituminous Concrete Top	Hetherington Berner	5000	83.4
Saginaw Asphalt Paving Co. Perry	M 19041 C1-RN	M 78	Bituminous Concrete	Barber-Greene	Continuous	87.2
	M 76021 C1-RN		Binder			
Saginaw Asphalt Paving Co. Perry	M 19041 C1-RN	M 78	Bituminous Concrete	Barber-Greene	Continuous	52.8
	M 76021 C1-RN		Top			
Sparton Asphalt Co. Holt	M 33081 C1-R	US 16	Bituminous Concrete Binder	Standard	4000	81.7
Sparton Asphalt Co. Holt	M 33081 C1-R	US 16	Bituminous Concrete Top	Standard	4000	66.4
Sparton Asphalt Co. Williamston	M 33082 C1-R	US 16	Bituminous Concrete Top	Standard	3000	69.1
Thornton Construction Co. Epoufette	M 49022 C1-R	US 2	Bituminous Concrete	Madsen	6000	148.6
	M 49023 C3-R		Binder			
Thornton Construction Co. Epoufette	M 49022 C1-R	US 2	Bituminous Concrete	Madsen	6000	146.6
	M 49023 C3-R					

APPENDIX A Continued

Contractor	Project	Location	Type	Manufacturer	Batch Weight	Tons/hour
Thornton Construction Co. Epoufette	M 48022 C1-R M 49023 C3-R	US 2	Bituminous Concrete Top	Madsen	6000	117.6
Thornton Construction Co. Germfask	F 7511 C4-R	M 77	Bituminous Concrete Leveling	Madsen	6000	128.4
Thornton Construction Co. Germfask	F 7511 C4-R	M 77	Bituminous Concrete Top	Madsen	6000	113.5
Thornton Construction Co. Kinross	M 17031 C1-RN	US 2	Bituminous Concrete Leveling	Madsen	3750	71.1
Thornton Construction Co. Kinross	M 17031 C1-RN	US 2	Bituminous Concrete Top	Madsen	3750	68.6
Thornton Construction Co. Negaunee	M 52042 C1-R M 52032 C2-U	US 41 US 41	Bituminous Concrete Leveling	Madsen	3000	59.6
Thornton Construction Co. Negaunee	M 52042 C1-R M 52032 C2-U	US 41 US 41	Bituminous Concrete Top	Madsen	3000	49.0
Williams Brothers Watrousville	CS 7965 C3	Colling Rd.	Bituminous Aggregate 4:09	Barber-Greene	Continuous #848	113.3
H. L. Workman Jackson	M 38032 C1-R	US 127	Bituminous Concrete Leveling	Hetherington Berner	2500	43.2
H. L. Workman Jackson	M 38032 C1-R	US 127	Bituminous Concrete Top	Hetherington Berner	2500	47.0
Wright Construction Co. Flint	M 2517 C8-R	M 15	Bituminous Concrete Binder	H & B	5000	66.7
Wright Construction Co. Flint	M 2517 C8-R	M 15	Bituminous Concrete Top	H & B	5000	79.0
Wright Construction Co. Lansing	M 2917 C9-RN	US 27	Bituminous Concrete Binder	H & B	3750	61.0
Wright Construction Co. Lansing	M 2917 C9-RN	US 27	Bituminous Concrete Top	H & B	3750	46.2