

specify within reasonable limits, certain requirements of bitumen and aggregate as have been shown by actual practice to produce successful results. These requirements, as provided in the new specifications prepared for the city of Chicago, are as follows:

	Per Cent.
Bitumen soluble in cold carbon bisulphide	10.5—13
Portland cement and mineral dust passing a 200 mesh sieve	12.0—18
Sand passing an 80 inch sieve.....	18.0—18
Sand passing a 40 mesh sieve	30.0—50
Sand passing a 10 mesh sieve.....	8.0—20
The sieves being used in the order named.	

A mixture prepared without discretion, to come within these limits, might still be unsatisfactory. For example, should the mineral aggregate grade according to the maximum coarseness allowable, a bitumen content of 13 per cent. would be entirely too much likewise an extremely fine aggregate would have more than the minimum percentage of bitumen to produce a satisfactory mixture. Given a sand of a definite grading and a specified amount of filler to be incorporated, the amount of asphalt cement to be used can be regulated by the appearance of a stain produced by compressing a portion of the hot mixture between a sheet of light manila paper. If the mixture is rich, the excessive amount of asphalt cement will stain the paper heavily; if dry, the stain will be light. In making this test, it is necessary to consider the temperature of the mixture tested and the manner in which the pressure is applied. A very hot sample and excessive pressure will indicate a degree of saturation not at all true, so that it is necessary to apply such test with discretion.

It is the duty of the inspectors at the plant to watch the surface mixture as produced, very carefully, and to make such rough tests as described above to ascertain its correct proportioning. When a mixture has once been established as satisfactory, it is their duty to see that the established proportions are uniformly mixed. The carelessness of the men employed in the actual mixing of the material is sometimes remarkable. The great desire at many plants is to turn the mixture out fast. The greater output means economy in cost of production, and in the attempt to hurry the mix the proportions are often inaccurately gauged and the material is imperfectly mixed. The measuring and weighing devices are liable to get out of order and register inaccurately, and many a street, the mixture of which has been planned with the best of intention, has been faulty for reasons of this nature. The inspector must see that nothing of this sort occurs, that the mixture is actually being produced according to approved proportions. While any error would eventually be checked up by the laboratory, in a large city it might be days before this were accomplished.

The temperature at which the mixture is produced is of great importance, and there is a tendency among most plant men to neglect this altogether, or to heat the mixture unnecessarily in order that it may work easier on the street. The minimum heat compatible with proper workmanship is desirable. There is no occasion for heating above such a temperature. A mixture may not be actually burned by an elevated temperature, for there is every stage of injury between being first-class and the final stage of being burned, and while a mixture may show very little evidence of heat injury, its ultimate life may nevertheless be seriously shortened. Inspectors are required to hold their mixtures at low workable temperatures, keeping the sand passing out of the drums at such heat as to insure the desired temperature in the final mixture. Plant inspectors report daily on the following form:

Report of Asphalt Plant.

Plant No. 8

October, 14, 1908.

Asphalt Cement.

Lbs. Flux to		Kind of Asphalt	
Kettle No.	100 R. A.		
1	22	Top, Trinidad	
2	22		
3	22½	Binder Trinidad	
Kind of Flux, Texas			
Binder	Lbs.	Top	Lbs.
A. C.	65	A. C.	165
Sand	105	Dust	110
Stone	815	Cement	
		Sand	740

Total per box.....	985		1,015
No. boxes binder, 42		No. boxes top, 300	
Sent to Lake Avenue, 37th Street to Oakwood Blvd.		Sent to Lake Avenue, 37th Street to Oakwood Blvd.	
New materials received this day:			

1 Car Trinidad Asphalt
3 Loads Stone Dust

Remarks

A. Smith, Inspector.

Samples of the mixture, are sent in daily to the laboratory from the street in a special envelope giving necessary data as shown in the following form:

City of Chicago Board of Local Improvements.

Lab. No. October 14, 1908.

Sample of Asphalt Top from Lake Avenue.

Between 37th and Oakwood Boulevard, opposite house

No. 3,902 on west side of street

Here is inserted a plat of the square on which a star
locates the place from which the sample was taken.

Load No. 18

Time 11.15 a.m.

Plant 8

O. H. Noyes,

Sub-Paving Inspector.

The street inspection in the City of Chicago is under
separate head.

These samples are analyzed and filed.

From the descriptions given it is possible to locate defective mixtures, and, further, at the end of the season, it is possible to make up plats of each street showing where various mixtures and various materials have been laid. To insist in this the plant inspectors are directed to locate in the street points where new materials or changes of mixture have been made, so that in after years it would be possible to judge of the causes of failure or success of any street with accurate knowledge of materials and conditions under which it was laid. A final record is made up and filed, giving complete data regarding the street, including plats, nature and analysis of all materials used in its production, with daily record of the composition of the mixture and any physical condition of base, sub-grade and traffic affecting the life of the pavement.

In conclusion may be emphasized the absolute necessity of keeping accurate records as described above. For scientific progress in this industry it is essential that the actual results obtained be closely observed, so that with known conditions it is possible to benefit by good results, to be able to reproduce them and to avoid such influences as are demonstrated to involve error and failure. An asphalt laboratory is valuable only for the practical results attained, and not for new theories evolved each year, unless such theories are sufficiently demonstrated by actual results obtained, under known conditions.