occur at convenient intervals to assist in breaking out the stone. The quartz diorites have such jointing at many places. The basalts, however, are at many places too minutely jointed to yield large blocks. Moreover, basalt is generally very tough and difficult to work.

Last of all, the location of quarries is determined largely by accessibility either to the locality where the stone is to be used or to transportation facilities. The Quaternary limestone of Môle St.-Nicolas is well located for transportation by water. Similar stone probably could be obtained near the railway on the terraces of coralliferous limestone on Cap-St.-Marc. The quartz diorites of the north could be obtained near the railway between Grande-Rivière du Nord and Bahon, although they are not so handsome there as farther east. At present there is little demand for stone of this kind.

ROCK FOR CONCRETE.

Rock for concrete should be reasonably hard and should consist of material so graded in size that the smaller pieces will fill the open spaces between the larger ones. A rough surface probably increases the binding power, and for this reason crushed stone has been preferred by many engineers to rounded gravel, some even prescribing that gravel, if used at all, should be crushed. Experience in the Republic of Haiti has shown that this is generally unnecessary and that the natural gravel makes excellent concrete. The gravel is composed mainly of pebbles of hard limestone or of igneous rock, either of which are satisfactory. Crushed stone from these same rocks would of course be equally satisfactory. However, machinery for crushing has not been available up to this time, and breaking by hand is so expensive that gravel has been used almost entirely.

LIME.

A great deal of lime is made in the Republic for domestic use. Most of it is used for mortar or for whitewash. All the pure limestones are burned to make lime, and occasionally coral heads from the living reefs are used. Small quantities of lime are made by mixing wood and stone and burning in heaps in the open air. For larger quantities crude kilns are made, preferably on chalky hillsides. A pit is dug like a well, and an entrance is made at the base by a tunnel if necessary. The fuel is placed below and the rock above. By neither method can the rock be burned completely and evenly, and the product is inferior to that of carefully operated commercial plants.

Much of the limestone of the Republic is remarkably pure, as is shown by the two analyses in the following table. Rock of this kind makes a quick setting high-calcium lime.

Analyses of limestone.

Sample No.	Lime (CaO).	Magnesia (MgO).	Carbon dioxide (CO_2).	Silica (SiO_2).	Alumina (Al_2O_3) and ferric oxide (Fe_2O_3).	Total.
1	55.60	0.45	43.45	0.14	0.26	99.90
2	55.12	0.56	43.18	0.50	0.20	99.56

Sample 1 was obtained from the middle Eocene Plaisance limestone at the top of Mont Puilboreau between Ennery and Plaisance. Sample 2 was obtained from beach gravel about 3 kilometers southeast of Mont-Rouis, where the shore touches the base of the Chaîne des Mateux. It is composed of pebbles of hard Eocene limestone and possibly in part of Oligocene limestone. Of course not all the limestones of the country are so pure as these samples, but rock of equal purity is plentiful.

The amount of lime consumed in the Republic is probably equal to the output of a large modern factory. However, if such a plant were erected it could scarcely compete successfully with the inferior but cheap lime made by the present crude methods. If sugar refining, which requires lime of high purity and uniformity, should continue to increase a plant to supply this trade might possibly be successful. A factory located near Port-au-Prince doubtless could find satisfactory limestone on Morne Hôpital. Good limestone could also be obtained very near the railroad, about 3 kilometers southeast of Mont-Rouis, near the place where sample 2 was collected. Many other reasonably accessible localities could supply limestone of satisfactory quality.

MATERIAL FOR CEMENT.

The Republic of Haiti probably contains an abundance of raw materials suitable for the manufacture of Portland cement, although present economic conditions do not favor their utilization.

According to the United States Geological Survey,[1] "The ordinary Portland cement mixture, when made from normal and natural raw materials, contains about 75 per cent of lime carbonate ($CaCO_3$) and 20 per cent of silica (SiO_2), alumina (Al_2O_3), and iron oxide (Fe_2O_3) together, the remaining 5 per cent including magnesium carbonate, alkalies, sulphur, and other unavoidable but unnecessary constituents." The United States Geological Survey states further[2] that the amount of silica present should be from two to three and one-half times the combined

[1] Eckel, E. C., Burchard, E. F., and others, Portland cement materials and industry in the United States: U. S. Geol. Survey Bull. 522, p. 41, 1913.
[2] Idem, p. 65.