

Lime Kilns

by

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Archaeologists who have found lime kilns in their excavations may find it of interest to know how present day lime kilns work.

In 1971, the writer served as forman for the Hesban Expedition directed by Dr. Siegfried H. Horn. The expedition had discovered a lime kiln in 1968. The kiln was completely cleared in 1971 (Area B square I Locus 10).¹ Final excavation revealed an oval shaped installation (3×4 m.) lined with dressed (mason-cut) stones. Seven to eight courses of the lining were still preserved. The pit for the structure (kiln) was cut through 3 meters of occupational debris. The pottery of this fill has been dated to the 6th - 7th century B. C. but the pottery within the kiln ranged from Hellenistic to Late Arabic which supposedly dates the kiln to the Late Arabic period (12th century A. D.). As found, the kiln was filled with various sized socks and earth. The interpretation of the inside faces of lining stones were charred (calcined) and partially separated from the rest of the stone (S). Final clearance showed a slightly concave bottom of mixed ash and lime. There were no flues or openings which one might assume as necessary for the draft of the

fire. This raised a problem as to how the kiln worked if it is a kiln.

A cousin of the writer comes from the village of Ramun 20 km. east of Ramallah. He has provided the information on which the attached sketch of a modern kiln and its operation is based.

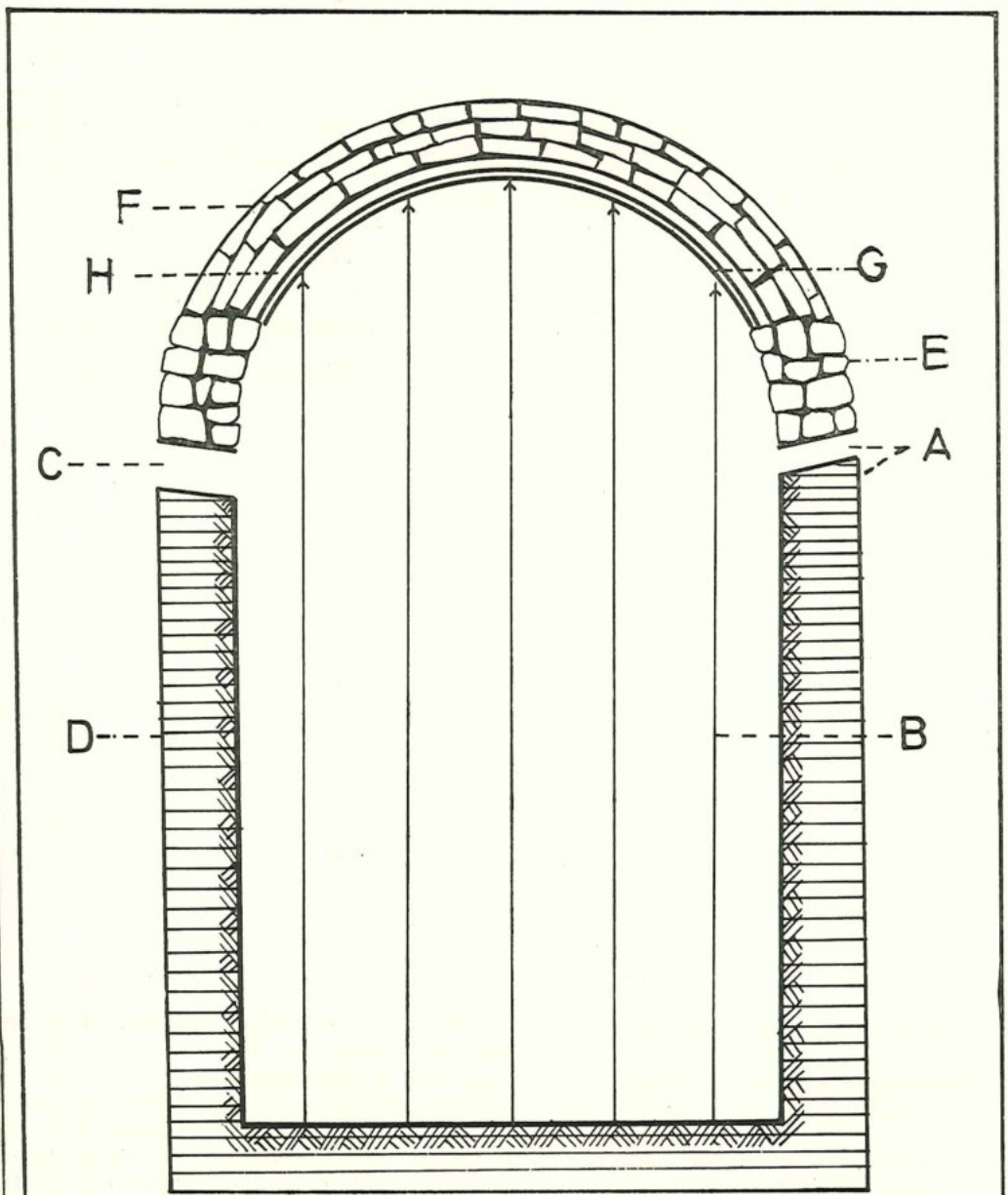
A cylindrical cut or ditch with a diameter of 3-4 meters and 3-5 meters deep is cut in the earth (see A in the sketch). A wall (E) about one meter thick and 1.25 m. high is built around the edge of the ditch.² There must be two openings in this wall a large one (C) 80×50 cms and a smaller one 40×30 cms. opposite to the first. The larger hole is used to supply wood to the fire while the smaller one serves as a smoke hole. The stone (F) to be burnt for lime is placed in several layers on a roof (G and H). The amount of stone of course determines the quantity of lime obtained, but too many layers of stone take an excessive amount of wood. The roof is formed of long poles of wood (B) which support a layer of branches (G) over which is placed a layer of mud (H) at least 10 cm. thick. The stones to

(1) Siegfried H. Horn; Roger S. Boraas, *The First Campaign of Tell Hesban*, (Andrew University Seminary Studies, Leiden, E. J. Brill, 1969), vol. VIII, no. 2, pp. 118-9.

(2) Sometimes wall E starts from the bot

tom of the ditch and goes up. This was the design of the Hesban kiln. When the same kiln is used many times, the interior face of the wall may be covered with palster.

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|---|---------------------------------------|----|-----------------------------|
| A | Cylindrical cut 3-5 m deep diam 3-4 m | E. | stones wall |
| B | Supporting wooden pieces | F. | Limestones |
| C | Opening to put wood in | G. | Layer of branches |
| D | = for smoke and extra ash | H. | - 10 c.m layer of thick mud |



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be burnt are laid in a dome without mortar so that they will not fall into the pit after the wood is burnt. This same method of dome construction can still be seen in old village houses.

Large amounts of wood must be ready for use when the firing is started.³ The fire is kept burning continuously day and night for five to six days. Usually eight men work in two shifts. The baking process is considered finished when flames come through the top layer of stone. Then the fire is allowed to burn out and the stone is allowed to cool. The baked stones are removed one after the other from the dome. The product is sold or distributed

in the form of these baked rocks. This is un-slaked lime. For use, such as white wash or mortar, the user puts the baked rocks in a pail or a barrel and slowly pours water on the stone slowly stirring until the mixture is ready for use.

The quality of the product is determined not only by this arduous process, but by the quality of the original stone. The excavators of Samaria have noted that both modern and ancient Sabastians favour the marble and high quality lime stone of ancient buildings for this purpose.⁴ This is true for other ancient sites as well.⁵

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(3) Some modern kilns use diesel fuel.

(4) J. W. Crowfoot, K. M. Kenyon, E. I. Sukenik, *The Buildings at Samaria*, (Palestine Exploration Fund, London, 1942), vol. I, p. 139.

(5) See also: Olga Tufnell et al, *Lachish III*, (London, Oxford University Press, 1953), vol. III, p. 179 (104). Crowfoot et al, *The Buildings at Samaria*, vol. I, p. 139. James B. Pritchard et al, *Winery Defenses and Soundings at Gibeon*, (Philadelphia, The University Museum, 1964), pp. 10,

11 and 24. Cf. especially G. Dalman, *Arbeit und Sitte in Palestina*, vol. VIII, p. 22f. R. J. Forbes, *Studies in Ancient Technology*, vol. VI, p. 66ff. Prausnitz, *Excavations at Shavei-Zion*, (Monograph of Archaeology and Art vol. II, Rome, University of Rome), p. 17. B. Mazar, "The Excavations in the Old City of Jerusalem: Preliminary Report of the First Season," in *The W. F. Albright Volume*, (1968), p. 8; p. 21.