Good research paper on lake moeris quarry road-egypt

Transportation, Road

\n[toc title="Table of Contents"]\n

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Abstract

The Lake Moeris Quarry Road built while the Old Kingdom of Egypt between 26th and 22nd centuries B. C. is the oldest paved road of the world and is testimony to the excellent sense of planning and execution of the ancient Egyptians of that period. The 8-miles of the main road was built by placing large stone blocks that were kept on the desert sand and to facilitate passage of sledges filled with blocks of Basalt to the quay of Lake Moeris, and then on to River Nile. Those Basalt blocks were shipped downstream of Nile to construction sites in and around Cairo where huge monuments and pyramids were built. Thus, the road helped ancient Egypt achieve such a great architectural excellence.

Forewords

High quality roads are important for the economic growth of the country. Much of the investment is utilized for developing road networks for sustainable development. Moreover, the focus is used to being given for the maintenance of developed roadway network to keep sustainability. Lake Moeris Quarry Road refers to an ancient paved road excavated by archeologists led by American researchers in the district of Faiyum in Egypt and is branded as the oldest road of the world. The road is supposed to have been built during the period of Old Kingdom of Egypt, a period ranging from 26th to 22nd centuries B. C (" ASCE").

A Synopsis on Lake Moeris Quarry Road

James and Bown, the two geologists from the U. S., stumbled upon this stretch of road during mapping of the area that must have been built 4600 years ago to meet demands for basalt stones for temples and pyramids. They predicted that the first paved road may have been built to facilitate ferrying of stones from this desolate region to the construction site. This road helped humanly drawn sledges laden with basalt blocks to be carried ultimately to construction sites near Cairo. While reporting the discovery, they exclaimed, " Here is another technological triumph one can attribute to ancient Egypt" (Wilford).

Some researchers of America have also discovered the oldest paved road which is 4600 years old. That road was linking basalt quarries in far off and desolate region of deserts to waterways in Lake Moeris on to the river Nile to sites of monuments near Cairo in Egypt. The road is older by at least 500

years than any other ancient road discovered anywhere in the world. According to them this paved road is the only one of the ancient Egypt discovered so far. The construction of this road cannot compete with that of Pyramids and other monuments, but if one consider the age in which it was built it is a marvelous feat of engineering. They further opined that the road was built at an age; they could hardly think people had the necessary expertise of building a road of that kind. The researchers additionally discovered in the quarry at the end of the northern end of the road rock saws employed to cut stones and basalts into blocks (James, and Bown 71-79; Wilford). They further opined that this has been acknowledged as the oldest tool used to cut stones. They did not expect ancient Egyptians to have the two technologies, and wondered why those technologies were abandoned subsequently.

Figure 1 Image of Ancient Lake Moeris Quarry Road

This road has been discovered in the depression of Faiyum, around 45 miles south-west of Cairo. The geologists further added that earlier geologists had discovered a segment of this road earlier, but not much importance was given to this discovery at the moment, and was not followed up. The site was discovered eventually by Bown and his colleagues while performing geological mapping of the region. Evidently, this road was built to ferry blocks of black basalts from quarry that produced basalts due to volcanic eruptions that took place around 30 million years ago. The geologists have also stumbled upon camps used as dwelling places by workers of the ancient times. Numerous artifacts and potsherds at the site date back to the Old Kingdom of Egypt that took shape in around 2600 B. C.(Wilford).

This road ends abruptly in the midst of the desert. However, at the time of its construction, its end point or terminus was a quay of Lake Moeris that existed at 66 ft above the sea level. The modern lake there referred as Birket Qarun now exists at 148 feet below the sea level at the bottom of the depression. That exhibits drastic climatic and topographical changes taking place at this region. It was from annual floods of the river Nile from where Lake Moeris got its water. During that period, the level of water in the lake as well as in a river used to be the same. The water came into the lake through gaps existing at the modern villages of Hawara and el-Lahun between two hills separating the lake from the river. Experts believed that blocks of basalt were kept at barges during the dry season, and were floated to the river Nile during flooding of the river for shipping them to sites of monuments at Saqqara and Giza (Thomas and Maugh).

Figure 2 Quarry Lake: End Terminal Lake Moeris Quarry Road

Moreover, it extended to nearly eight miles and was used to transport heavy basalt blocks from quarries existing around 43 miles south-west of Cairo to a quay on shores of Lake Moeris that was 66 feet above the sea level at that moment. The destination of those basalt blocks was royal pavements and sarcophagi for morgue temples at places adjacent to Cairo. During the flooding of river Nile, waters reached the Lake Moeris through gaps between hills that separated the river with the lake. During that period, Egyptians could float basalt blocks to River Nile through the lake, and ultimately to Cairo and construction sites. The average width of the road was six and a half feet, and was built with slabs of limestone and sandstone. Even logs of petrified wood were used along with other stones.

Material and Construction Methodology

Experts speculated that logs of wood were used to facilitate sledges with basalt blocks to slide. These sledges were manually dragged to the shore of ancient Lake Moeris. The stones were used to build this road with the intention of preventing sledges from sinking into desert sands (" ASCE”). In addition, large stone slabs and flagstones were used that were laid on the desert sand without preparing the surface. The type and nature of stones vary from place to place, and it supports the assumption that ancient Egyptians used whatever they could lay by hands upon to build that road. The width of the road has been four cubits; each cubit measures the length of a human forearm which is approximately 18 inches in modern terms. The main road extends to around eight miles, but there are few branches of this road, and the total length is estimated at 11 miles (" ASCE”; Thomas and Maugh).

Basalt had been employed to manufacture small vessels during Late Predynastic Period in ancient Egypt. It was first used for pavements in mortuary temples in Giza and Saqqara regions during Old Kingdom. It was also employed to manufacture sarcophagi or boxes for the upkeep of royal corpses. This material has been used for funeral purposes possibly because it symbolized the dark mud of river Nile that is considered ‘ life giving'. The First — Second, and Third Intermediate periods — basalt was hardly used, but during late, Ptolemaic, and Roman periods, this wonderful stone was usually used for statuary, and occasionally for architectural purposes. It is only in the Faiyum district of Egypt region where evidence of quarrying during the period of Old Kingdom is available. It is believed that it was only

Faiyum region which was quarried on a large scale during the Old Kingdom for the purpose of producing sculptures, monuments, and images. The Lake Moeris Road facilitated quarrying and transportation that provided an incentive to the architectural efforts of that period (James, and Bown 71-79) .

Vessels made of basalt have been extensively found at various sites in Egypt south of Cairo, such as in Saqqara, and Elephantine. These vessels were extensively produced and used throughout the Predynastic and Early Dynastic. It is difficult to pinpoint from where raw materials for these vessels were procured as Basalts were found at numerous places in Egypt (Mallory-Greenough, and Greenough 1261–1272).

This road facilitated the stone cutting industry to prosper. To protect the ancient site from the mindless extraction of Basalt and to preserve quarries in the north Fayoum, the Supreme Council of Antiquities is exploring the possibility of inclusion of this region within Wadi Al-Rayan Protected Area under the UNESCO. The ancient Egyptians built numerous almost innumerable monuments in commensurate with their religious faith. This feat helped them excel in art and architecture. They strived hard to provide material form to their religious convictions and concepts. They desired to make those material forms to last up to the last post, and hence, they turned to stones that were available in abundance both in variety and quantity in the country. They used alabaster, soft limestone, harder sandstone, granite, and basalt to express their art in the forms of mortuaries, monuments, Pyramids, and sarcophagi. Since around 2700 BC, during the Third Dynasty stone was employed extensively for the purpose of construction. The Step

Pyramid at Djoser in Saqqara is the first such specimen of the stone architecture in the history of Egypt. Pharaoh built the royal dwelling places and funerary complexes for the purpose. It was just the starting of construction of uncountable monuments and building of projects for the three millennia that followed all over Egypt. The extensive architectural activities undertaken by the people of ancient Egypt were facilitated by the development of necessary infrastructures, skilled and unskilled work force, and economic situations including transportation facilities like the Lake Moeris Road.(Mallory-Greenough, and Greenough 1261–1272)

The contemporary basalt quarries at Widan Al-Faras meaning Ears of the Horse, so called after the two hills standing as a milestone geological feature in Gabal Qatrani, existed at around 80 km southwest of Cairo in the north of Fayoum. This region is the best preserved geological site of ancient Egypt and from where basalt blocks were extensively used for architectural purposes. The Widan Al-Faras provided subtle insight into the stone technology and the living conditions of people working in the stone industry during such early period of human civilization, around 4500 years ago. Basalt was the choice as construction material due to its black color symbolizing dark alluvial soil of the Nile valley which was so fertile, and at the same time, on which the entire Egyptian civilization depended. The site being located in a remote, desolate area far away from construction sites, it required some transportation facilities, and Lake Moeris Road was the necessary link in this regard. It exhibited the infrastructure development and planning of the ancient Egyptians. They also predicted that the road is the oldest and pristine specimen of paved road for the entire world. Constructed with

flagstone to gain access to quarries at Widan Al-Faras, the road facilitated the extraction, exploitation, and transportation of geological resources of the region. As many as eight quarries were connected with side roads emanating from the main long road which led southwards to quay of the Lake The lake contained large amount of water in the middle of the Fayoum oasis (Tomoum).

Not much evidence is available about the huge labour force used in the construction of monuments and the Lake Moeris Road. However, one can safely visualize the scenario existing in the ancient Egypt, and come to the conclusion that large human force must have been employed to get the road constructed. Laborers must have dragged large blocks of limestone and sandstone cut by stone saws to places of construction. Stone saws used for cutting stones in the Fayoum region in that period is considered as the oldest known tool for stone cutting. Experts feel that stone blocks were laid down to construct the road without preparing the surface. Sledges were used to transport Basalt blocks, and those sledges were dragged or pulled manually from the basalt quarries to the quay of Lake Moeris and on to river Nile. At the quay, basalt blocks were loaded in boats that ferried them across the lake to Bahr Youssef Canal which passed through the gap between the two hills Hawara and Lahun. After reaching Nile, these boats headed downstream to fields of Giza, Saqqara, and Abusir where world famous Pyramids were built. Besides Pyramids, basalt blocks were used to construct floors in mortuary temples, causeways, and walls (Tomoum).

Inscriptions on stones found in excavations revealed that around 4000 persons were employed in mining work in different quarries. Those men were

well treated and looked after with foods and “ five liters of beer everyday” and “ no man got lost” (Klemm and Klemm, 631-642). It may well be deduced that those men were not slaves and prisoner, and it looks surprising. The traces of camps at the sites are indicative of the same. However, as per another study, working conditions of laborers in quarries must have been pitiable as they had to work in desolate areas far away from cities and towns. The workforce recruited must have been slaves and " damnati", persons politically condemned without any hope of reprieve. It is estimated that around 10000 tons of stones were excavated and transported. So the related expenditure must have been giant with constructions of paved road through the desert, a fortified camp and well at every stretch of the area at a distance of 15 to 25 km, and a number of settlements including Serapis temples and Isis. Also, due to annual floods, men used to sit idle for around five months in a year as there were no agricultural activities possible during the period. Secondly, to quell the rebellion and to keep the Dynastic rule dominant, those at the helm of affairs used the idle work force during floods for stone cutting and transportation activities. Despite adverse conditions, the magnitude of stone work undertaken during such ancient period is commendable by any standard as providing necessary infrastructures at the moment was a gigantic task. The construction of Lake Moeris road is a case in point. It manifests the existence of a well planned and executed logistical organization of the Egyptian system (Klemm and Klemm, 631-642).

Road Construction in Modern Era

In modern times, such kinds of roads, buildings, dams, canals, and bridges would be built entirely differently. Mechanization and technology are the two watchwords ruling the roost in the present era. Men would be employed to operate machines and such other tools. In building a road, there will first be a planning; the land would then be suitably prepared by the use of JCBs, road rollers, and such other machines. It will involve civil engineers, technicians, planners, and skilled and unskilled workforce. Manually practically nothing will be done. Such small activities as mixing of cement with sand, water, stone chips, and the likes are done mechanically. Even sprinkling of coal tar is done through a machine. Thus, construction of the road in modern times will be drastically different from that done during the ancient times in Egypt (Mallory-Greenough, and Greenough 1261–1272).

Similarly, a building, a monument, a canal, or a dam is built by the use of such things as cement, marbles, tiles, bricks, and even stones in the modern times. It will not be labor intensive as in the case of pyramids and mortuaries in ancient Egypt, but as already said, machines and technologies will be extensively be used. It will not be blocks of stones and basalts that will be used in the manufacture of monuments and buildings in the present era.

The different state of art systems is in practice including computer simulation and modeling. Strategies are developed by considering society, firms, industry and so forth. These systems facilitate the system designers for dynamic planning and time scheduling. The site and route selection is an important step in the construction of roads . Modern technology has made it is easy to decide route selection of the road by employing mapping and

satellite imaging. Different sources and departments are available for providing the topography of the site area. Surveying methodology that is equipped with digital instruments has made it easy to calculate quantitative and qualitative analysis of any particular site area under construction. Density and strength of sub-soil is evaluated with modern equipment in the laboratory. The thickness of the base and sub-base is designed. During this design procedure, the different characteristics of gravel used in base and sub-base are evaluated. In this modern era, the strength of each layer is measured during the construction process. In the case of the mountainous area or harsh weather area, land sliding phenomena is taken into consideration, Proper remedial measure including retaining walls, vegetation and other strategies are employed. The designers and field engineers have access to rainfall data for the particular sites or region in which road is being constructed. Modern machinery and tools are available for cutting the stones and rock (Mallicka and Michael 61-73).

There is an important fact that, at this time, it will not be slaves or prisoners employed for construction purposes, but all those men working to build a structure would be paid at least the minimum wages and amenities prescribed. Those amenities will include security, food, shelter, medical facilities, fixed working hours, adequate wages, and the likes. It will not be primitive tools like stone saw that will be used, but construction activities in the present times would involve technologically developed equipment and machines.

Conclusion

Lake Moeris Quarry Road, a stretch of paved road built between 26th and 22nd century B. C. in the Faiyum district of Egypt and has been widely acknowledged as the world's oldest road . It was built to facilitate transportation of basalt blocks and material for construction sites from in and around Cairo via Lake Moeris and the river Nile. This road helped sledges laden basalt stones to be pulled manually to the quay of Lake Moeris and then to river Nile for shipping. American geologists mapping the area stumbled upon this road recently. It was the contemporary culture and civilization that necessitated the construction of this road. These stones were required in large numbers for construction of royal pavements, sarcophagi for morgue temples, pyramids and such other monuments that the craze of the rulers and the royalties of ancient Egypt. The 8 mile main road had a width of six and a half ft, and was built by limestone and sandstone.

The road speaks volume about the knowledge of the ancient Egyptians with respect to planning and execution. It helped them achieve architectural excellence. It also exhibits their acumen in creating employment opportunities for localities that were rendered jobless for around five months due to floods each year.

References

James, A, and Thomas M Bown. " An old kingdom basalts quarry at Widan el--Faras and the Quarry Road Lake Moeris" Jr of the American Research Center in Egypt. 32. (1995): 71-79. Web. 29 Mar. 2014. .

" Lake Moeris Quarry Road." ASCE. n. page. Web. 29 Mar. 2014. . Source: Al-

Ahram Weekly

Mallicka B. Rajib, Michael Radzicki, Martins Zaumanis and Robert Frank " Use of systems dynamics for proper conservation and recyclings of aggregates for sustainable road construction" Resources, Conservation and Recycling, 86.(2014): 61-73. Print.

Mallory-Greenough, Leanne M, and John D. Greenough. " The stone sources of predynastic basalt vessels: Mineralogical evidences for quarries in Northern Egypt." Journal of Archaeological Science. 26. (1999): 1261–1272. Print.

Thomas , H, and MAUGH 11 . " Archeologists Find World." Los Angles Time 07 May 1994, n. page. Web. 29 Mar. 2014. .

Tomoum, Nadja. " Fayoum's ancient quarry under threat." Al-Ahram Weekly. 05 Apr 2006: n. page. Web. 29 Mar. 2014. .

Wilford, John Noble. " World's Oldest Paved Road Found in Egypt." New York Times 08 May 1994, n. page. Web. 29 Mar. 2014.